

WATERSHED WATER QUALITY ASSESSMENT

SAVANNAH AND SALKEHATCHIE RIVER BASINS

TECHNICAL REPORT No. 003-97
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
COLUMBIA SC
December 1997

PREFACE

In 1993, the South Carolina Department of Health and Environmental Control (SCDHEC) published the first in a series of five watershed management documents. *Watershed Water Quality Management Strategy: Savannah-Salkehatchie Basin* communicated SCDHEC's innovative watershed approach, summarizing water programs and water quality in the basins. The approach continues to evolve and improve.

The watershed documents facilitate broader participation in the water quality management process. Through these publications, SCDHEC shares water quality information with internal and external partners, providing a common foundation for water quality improvement efforts at the local watershed or large-scale, often interstate, river basin level.

Water quality data from the Savannah and Salkehatchie River basins were collected and assessed at the start of this second five-year watershed management cycle. The assessment incorporates data from many more sites than were included in the first round. This updated atlas provides summary information on a watershed basis. A waterbody index allows the reader to locate information on specific waters of interest.

A brief summary of the water quality assessments included in the body of this document is provided following the Table of Contents. This summary lists all waters within the Savannah and Salkehatchie River basins that fully support recreational and aquatic life uses, followed by those waters not supporting uses. More comprehensive information can be found in the individual management unit and watershed sections.

As SCDHEC continues basinwide and statewide water quality protection and improvement efforts, we are counting on the support and assistance of all stakeholders in the Savannah and Salkehatchie River basins to participate in bringing about water quality improvements. We look forward to working with you.

Questions, comments, and suggestions regarding this document, and water quality in the Savannah and Salkehatchie River basins, may be directed to:

Watershed Manager
Savannah and Salkehatchie River Basins
SCDHEC Bureau of Water
2600 Bull St.
Columbia SC 29201
(803)734-5300

Table of Contents

| | |
|--|----|
| Introduction: Watershed Planning in South Carolina | 1 |
| Water Program Overview | 2 |
| Monitoring | 2 |
| Lake Eutrophication Assessment | 4 |
| Natural Public Swimming Areas | 4 |
| Standards and Classified Waters | 4 |
| Groundwater | 6 |
| Water Supply | 6 |
| Capacity Use | 6 |
| Wetlands | 7 |
| Shellfish Harvesting Waters | 7 |
| Wasteload Allocation | 8 |
| Permitting | 8 |
| Stormwater | 9 |
| Nonpoint Source Pollution Control | 9 |
| South Carolina Water Watch | 10 |
| Implementation Process for Impaired Waters | 11 |
| Water Quality Indicators | 11 |
| Macroinvertebrate Community | 11 |
| Fish Tissue | 11 |
| Dissolved Oxygen | 12 |
| Biochemical Oxygen Demand | 12 |
| pH | 12 |
| Fecal Coliform Bacteria | 13 |
| Nutrients | 13 |
| Turbidity | 13 |
| Total Suspended Solids | 14 |
| Heavy Metals | 14 |
| Assessment Methodology | 14 |
| Use Support Determination | 14 |
| Aquatic Life Use Support | 15 |
| Macroinvertebrate Data Interpretation | 16 |
| Recreational Use Support | 16 |
| Fish Consumption Use Support | 16 |
| Human Health Standards | 17 |
| Additional Screening and Prioritization Tools | 17 |
| Long-Term Trend Assessment | 17 |

| | |
|--|--------|
| Sediment Screening | 18 |
| Water Column Metals Analyses | 18 |
| Groundwater Contamination Inventory | 19 |
| Land Use/Land Cover Data | 19 |
| Slope and Erodibility Data | 20 |
| Public Participation | 20 |
| Savannah and Salkehatchie River Basins | 21 |
| Land Resources | 21 |
| Physiographic Regions | 21 |
| Soil Types | 22 |
| Water Resources | 24 |
| Watershed Assessments | 24 |
| Management Unit WMU-0101 | 25 |
| Population | 25 |
| Climate | 25 |
| Fish Consumption Advisory | 25 |
| 03060101-020 | 26 |
| 03060101-030 | 28 |
| 03060101-040 | 29 |
| 03060101-050 | 32 |
| 03060101-060 | 34 |
| 03060101-070 | 36 |
| 03060101-080 | 38 |
| 03060101-090 | 39 |
| 03060101-100 | 41 |
| 03060102-030 | 43 |
| 03060102-060 | 44 |
| 03060102-120 | 45 |
| 03060102-130 | 46 |
| 03060102-150 | 47 |
| Management Unit WMU-0102 | 48 |
| Population | 48 |
| Climate | 49 |
| Fish Consumption Advisory | 49 |
| 03060103-020 | 50 |
| 03060103-030 | 50 |
| 03060103-070 | 52 |
| 03060103-080 | 56 |
| 03060103-100 | 57 |
| 03060103-140 | 59 |
| 03060103-150 | 61 |
| 03060107-010 | 63 |
| 03060107-020 | 64 |
| 03060107-030 | 65 |

| | |
|-----------------------------------|-----|
| 03060107-040 | 66 |
| Management Unit WMU-0103 | 67 |
| Population | 67 |
| Climate | 68 |
| Fish Consumption Advisories | 68 |
| Capacity Use Area | 69 |
| 03060106-030 | 69 |
| 03060106-050 | 70 |
| 03060106-060 | 74 |
| 03060106-100 | 76 |
| 03060106-110 | 77 |
| 03060106-130 | 79 |
| 03060106-140 | 80 |
| 03060109-020 | 81 |
| 03060109-050 | 82 |
| 03060109-060 | 83 |
| Management Unit WMU-0104 | 84 |
| Population | 84 |
| Climate | 84 |
| Fish Consumption Advisory | 84 |
| Capacity Use Area | 85 |
| 03050207-010 | 85 |
| 03050207-020 | 86 |
| 03050207-030 | 87 |
| 03050207-040 | 88 |
| 03050207-050 | 89 |
| 03050207-060 | 90 |
| 03050207-070 | 91 |
| 03050207-080 | 92 |
| 03050207-090 | 92 |
| 03050207-100 | 93 |
| 03050207-110 | 94 |
| 03050208-010 | 94 |
| 03050208-020 | 96 |
| 03050208-030 | 97 |
| 03050208-040 | 98 |
| 03050208-050 | 99 |
| 03050208-060 | 100 |
| 03050208-070 | 101 |
| 03050208-080 | 103 |
| 03050208-090 | 104 |
| 03050208-100 | 107 |
| 03050208-110 | 109 |
| 03050208-120 | 111 |
| 03050208-130 | 111 |
| 03050208-140 | 112 |

| | |
|------------------------------------|-----|
| Waterbody and Facility Index | 113 |
|------------------------------------|-----|

Appendix A. Public Participation Summary

Appendix B. Water Quality Data



Water Quality Assessment Summary
Savannah and Salkehatchie River Basins
(Reference maps follow tables)

INTRODUCTION: WATERSHED PLANNING IN SOUTH CAROLINA

The South Carolina Department of Health and Environmental Control (SCDHEC or the Department) initiated its first watershed planning activities as a result of a U.S. Environmental Protection Agency (USEPA) grant in June of 1972. These activities were soon extended by §303(e), "Federal Water Pollution Control Act Amendments of 1972", U.S. Public Law 92-500. In 1975, SCDHEC published basin planning reports for the four major river basins in South Carolina. The next major planning activity resulted from §208 of the Federal Water Pollution Control Act, which required states to prepare planning documents on an areawide basis. Areawide plans were completed in the late 1970's for the five designated water quality management areas of the State and for the nondesignated remainder of the State. These plans and their updated versions continue to serve as information sources and guides for water quality management.

During the past decade, special water quality initiatives and Congressional mandates have diverted attention and resources from comprehensive water quality assessment and protection. The Bureau of Water now emphasizes watershed planning to better coordinate river basin planning and water quality management. Watershed-based management allows the Department to address Congressional and Legislative mandates in a coordinated manner and to better utilize current resources. The watershed approach also improves communication between the Department, the regulated community, and the public on existing and future water quality issues.

By definition, a watershed is a geographic area into which the surrounding waters, sediments, and dissolved materials drain, and whose boundaries extend along surrounding topographic ridges. Through watershed-based water quality management, SCDHEC recognizes the interdependence of water quality-related activities associated with a drainage basin including: monitoring, problem identification and prioritization, water quality modeling, planning, permitting, and other activities. The Bureau of Water's Watershed Water Quality Management Program integrates these activities by watershed, resulting in watershed management plans and implementation strategies that appropriately focus water quality protection efforts. While an important aspect of the strategy is water quality problem identification and solution, the emphasis is on problem prevention.

Five major basin groupings divide the State along hydrologic lines. A Watershed Water Quality Management Strategy (WWQMS) has been created for each of the five basin groupings and will be updated on a five-year rotational basis. This allows for effective allocation and coordination of water quality activities and efficient use of available resources.

Watershed Managers investigate the impaired and threatened streams mentioned in the WWQMS to determine, where possible, the source of the impairment and recommend solutions to correct the problems. As part of this effort, the watershed staff is forging partnerships with various federal and state agencies, local governments, and community groups.

The watershed-based strategy partially fulfills a number of USEPA reporting requirements including various activities under §303(d), §305(b), §314, and §319 of the Clean Water Act (CWA). Section 303(d) identifies waters located within a watershed which do not meet applicable water quality standards and indicates where total maximum daily load (TMDL) development is applicable. Section 305(b) requires that the State biennially submit a report that includes a water quality description and analysis of all navigable waters to

estimate environmental impacts. Section §314 requires that the State submit a biennial report that identifies, classifies, describes, and assesses the status and trends in water quality of publicly owned lakes. The watershed plan is also a logical evaluation, prioritization, and implementation tool for nonpoint source (§319) requirements. Nonpoint source best management practices (BMPs) can be selected by identifying water quality impairments and necessary controls, while considering all the activities occurring in the drainage basin.

The Strategy also allows for more efficient issuance of National Pollutant Discharge Elimination System (NPDES) and State wastewater discharge permits. Proposed permit issuances within a watershed may be consolidated and presented to the public in groups, rather than one at a time, allowing the Department to realize a resource savings, and the public to realize an information advantage.

WATER PROGRAM OVERVIEW

The Water Program comprises activities within SCDHEC's Bureau of Water and Bureau of Environmental Services. The Program's objectives are to ensure that the water in South Carolina is safe for drinking and recreation, that there is plenty of it, and that it is suitable to support and maintain aquatic flora and fauna. Functions include planning, permitting, compliance assurance, enforcement, and monitoring. This section provides an overview of water quality evaluation and protection activities.

Monitoring

In an effort to evaluate the State's water quality, the Department operates a permanent Statewide network of primary ambient monitoring stations and flexible, rotating secondary and watershed monitoring stations. The ambient monitoring network is directed toward determining long-term water quality trends, assessing attainment of water quality standards, identifying locations in need of additional attention, and providing background data for planning and evaluating stream classifications and standards. Commonly used water quality indicators are described in the next chapter.

The monitoring data are also used in the process of formulating permit limits for wastewater discharges with the goal of maintaining State and Federal water quality standards and criteria in the receiving streams in accordance with the goals of the Clean Water Act. These standards and criteria define the instream chemical concentrations that provide for protection and reproduction of aquatic flora and fauna, determine support of the classified uses of each waterbody, and serve as instream limits for the regulation of wastewater discharges or other activities. In addition, these data are used in the preparation of the biennial §305(b) report to Congress, which summarizes the State's water quality with respect to attainment of classified uses by comparing the ambient monitoring network data to the State Water Quality Standards.

SCDHEC's water quality monitoring network comprises three station types: primary, secondary, and watershed stations. Primary stations are sampled on a monthly basis year round, and are located in high water-use areas or as background stations upstream of high water-use areas. The static primary station network is operated statewide, and receives the most extensive parameter coverage, thus making it best suited for detecting long term trends.

Secondary stations are sampled monthly from May through October, a period critical to aquatic life, characterized by higher water temperatures and lower flows. Secondary stations are located in areas where specific monitoring is warranted due to point source discharges, or areas with a history of water quality problems. Secondary station parameter coverage is less extensive and more flexible than primary or watershed station coverages. The number and locations of secondary stations have greater annual variability than do those in the primary station network, and during a basin's target year may have parameter coverage and sampling frequency duplicating that of primary or watershed stations.

Watershed stations are sampled on a monthly basis, year round, during a basin's target year; additional watershed stations may be sampled monthly from May through October to augment the secondary station network. Watershed stations are located to provide more complete and representative coverage within the larger drainage basin, and to identify additional monitoring needs. Watershed stations have the same parameter coverage as primary stations.

Many pollutants may be components of point source discharges, but may be discharged in a discontinuous manner, or at such low concentrations that water column sampling for them is impractical. Some pollutants are also common in nonpoint source runoff, reaching waterways only after a heavy rainfall; therefore, in these situations, the best media for the detection of these chemicals are sediment and fish tissue where they may accumulate over time. Their impact may also affect the macroinvertebrate community.

Regional ambient trend monitoring is conducted to collect data to indicate general biological conditions of state waters which may be subject to a variety of point and nonpoint source impacts. In 1991, the Department began using ambient macroinvertebrate data to support the development of Watershed Water Quality Management Strategies. Ambient sampling is also used to establish regional reference or "least impacted" sites from which to make comparisons in future monitoring. Additionally, special macroinvertebrate studies, in which stream specific comparisons among stations located upstream and downstream from a known discharge or nonpoint source area, are used to assess impact.

Qualitative sampling of macroinvertebrate communities are the primary bioassessment techniques used in ambient trend monitoring. A habitat assessment of general stream habitat availability and a substrate characterization is conducted at each site. Annual trend monitoring is conducted during low flow "worst case" conditions in July - September. This technique may also be used in special studies for the purpose of determining if, and to what extent, a wastewater discharge or nonpoint source runoff is impacting the receiving stream. A minimum of two sample locations, one upstream and one downstream from a discharge or runoff area, is collected. At least one downstream recovery station is also established when appropriate. Sampling methodology essentially follows procedures described in Standard Operating Procedures, Biological Monitoring.

Aquatic sediments represent a historical record of chronic conditions existing in the water column. Pollutants bind to particulate organic matter in the water column and settle to the bottom where they become part of the sediment "record". This process of sedimentation not only reflects the impact of point source discharges, but also incorporates nonpoint source pollution washed into the stream during rain events. As a result, contaminant concentrations originating from irregular and highly variable sources are recorded in the sediment. The sediment concentrations at a particular location do not vary as rapidly with time as do the water column concentrations. Thus, the sediment record may be read at a later time, unrelated to the actual release

time. Lakes act as settling basins for materials entering the lake system directly from a discharge or indirectly from the land surface washed into streams. Therefore, it is not unusual for lake sediment concentrations to be higher than sediment concentrations found in streams. This is especially true for chromium, copper, and zinc.

Lake Eutrophication Assessment

The trophic condition of South Carolina lakes is monitored through SCDHEC's network of routine sampling stations and through periodic sampling of additional lakes. All lakes of at least 40 acres in area that offer public access are monitored. Large (major) lakes are those greater than 850 acres in surface area. Minor lakes are those less than 850 acres in surface area.

Beginning with the 1989 statewide lake water quality assessment, a multi-parameter percentile index has been used to quantify overall lake trophic state. The index includes the following trophic condition indicators: water clarity, total phosphorus, total inorganic nitrogen, chlorophyll *a*, and dissolved oxygen. The baseline for this relative index is data collected during the 1980-81 statewide lake water quality assessment. Use of a baseline data set permits trend detection in subsequent assessments. Percentiles for major and minor lakes are derived separately. All data, as well as the programs for deriving index values, are maintained in USEPA's STORET database. A high index value indicates a desirable trophic condition, while low values indicate the need for further study or restoration.

Natural Public Swimming Areas

Natural Public Swimming Areas Regulation 61-50 regulates swimming areas located on lakes, rivers, streams, and ponds. The objective for monitoring these sites is to help offset the potential for parasitic and bacteriological related health outbreaks and to ensure the presence of required safety items. A construction permit is issued for each new facility. All new sites must be inspected and sampled prior to issuance of the final operating permit. During the swimming season, which normally lasts from May through August of each year, the regulated public swimming areas are subject to frequent inspection by the Department.

Standards and Classified Waters

The waters of the State have been classified in regulation based on the desired uses of each waterbody. State Standards for various parameters have been established to protect all uses within each classification. The water-use classifications follow.

Class ORW, or "outstanding resource waters", are freshwaters or saltwaters which constitute an outstanding recreational or ecological resource, or those freshwaters suitable as a source for drinking water supply purposes, with treatment levels specified by the Department.

Class FW, or "freshwaters", are freshwaters which are suitable for primary and secondary contact recreation and as a source for drinking water supply, after conventional treatment, in accordance with the requirements of the Department. These waters are suitable for fishing, and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. This class is also suitable for industrial and agricultural uses.

Class Trout Waters. The State recognizes three types of trout waters:

Trout natural waters, which are freshwaters suitable for supporting reproducing trout populations and a cold water balanced indigenous aquatic community of fauna and flora,

Trout put, grow and take waters, which are freshwaters suitable for supporting the growth of stocked trout populations and a balanced indigenous aquatic community of fauna and flora,

Trout put and take waters, which are freshwaters protected by the standards of Class FW.

Class SFH, or "shellfish harvesting" waters, are tidal saltwaters protected for shellfish harvesting, and are suitable also for uses listed in Classes SA and SB. SFH waters have the most stringent bacterial standards.

Class SA comprises "tidal saltwaters" suitable for primary and secondary contact recreation, crabbing and fishing. These waters are not protected for harvesting of clams, mussels, or oysters for market purposes or human consumption. The waters are suitable for the survival and propagation of a balanced indigenous aquatic community of marine fauna and flora.

Class SB are "tidal saltwaters" suitable for the same uses listed in SA. The difference between the Class SA and SB saltwater concerns the DO limitations. Class SA waters must maintain daily DO averages not less than 5.0 mg/l, with a minimum of 4.0 mg/l, and Class SB waters maintain DO levels not less than 4.0 mg/l.

The Standards are used as instream water quality goals to maintain and improve water quality and also serve as the foundation of the Bureau of Water's program. They are used to determine permit limits for treated wastewater dischargers and any other activities that may impact water quality. Using mathematical Wasteload Allocation Models, the impact of a wastewater discharge on a receiving stream, where flow is unregulated by dams, is predicted using 7Q10 streamflows. These predictions are then used to set limits for different pollutants on the National Pollutant Discharge Elimination System (NPDES) permits issued by the Department. The NPDES permit limits are set so that, as long as a permittee (wastewater discharger) meets the established permit limits, the discharge should not cause a standards violation in the receiving stream. All discharges to the waters of the State are required to have an NPDES permit and must abide by those limits, under penalty of law.

Classifications are based on desired uses, not on natural or existing water quality, and are a legal means to obtain the necessary treatment of discharged wastewater to protect designated uses. Actual water quality may not have a bearing on a waterbody's classification. A waterbody may be reclassified if desired or existing public uses justify the reclassification and the water quality necessary to protect these uses is attainable. A classification change is an amendment to a State regulation and requires public participation, SCDHEC Board approval, and General Assembly approval.

Natural conditions may prevent a waterbody from meeting the water quality goals as set forth in the Standards. The fact a waterbody does not meet the Standards for a particular classification does not mean the waterbody is polluted or of poor quality. Certain types of waterbodies (e.g., some swamps, lakes, and tidal creeks) naturally have water quality lower than the numeric standards. A waterbody can have water quality conditions below standards due to natural causes and still meet its use classification. A site specific numeric standard may be established by the Department and subjected to public participation and administrative procedures for adopting regulations. Site specific numeric standards apply only to the stream segment described in the water classification listing (Regulation 61-69), not to tributaries or downstream unspecified waters.

In April of 1992, the freshwater designations A and B were eliminated. Class A and B waters were reclassified as Class FW to protect all freshwaters for primary contact recreation. The main difference between Class A and B waters was the fecal coliform standard.

Class A waters were freshwaters which were suitable for primary contact recreation. This class was also suitable for uses listed as Class B. Class A waters were not to exceed a fecal coliform geometric mean of 200/100ml, based on 5 consecutive samples during any 30 day period; nor were more than 10% of the total samples during any 30 day period to exceed 400/100ml.

Class B waters were freshwaters which were suitable for secondary contact recreation and as a source for drinking water supply, after conventional treatment, in accordance with the requirements of the Department. These waters were suitable for fishing, and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. This class was also suitable for industrial and agricultural uses. Class B waters were not to exceed a fecal coliform geometric mean of 1000/100ml, based on 5 consecutive samples during any 30 day period; nor were more than 20% of the total samples during any 30 day period to exceed 2000/100ml.

Groundwater

Groundwater is an important resource for drinking water use, as well as agricultural, industrial and commercial usages. Based on USEPA Drinking Water Standards, the overall quality of South Carolina's groundwater is excellent. Contaminated groundwater is expensive and difficult to restore; therefore, groundwater protection for present and future usage is the management emphasis. Localized sources of groundwater contamination can include: septic tanks, landfills (municipal and industrial), surface impoundments, oil and gas brine pits, underground storage tanks, above ground storage tanks, injection wells, hazardous waste sites (abandoned and regulated), salt water intrusion, land application or treatment, agricultural activities, road salting, spills and leaks.

Water Supply

Water treatment facilities are permitted by the Department for municipal and industrial potable water production. According to the 1983 Water Use Reporting and Coordination Act (Act 282), all water users over 100,000 gallons per day must report their usage. This includes industrial, agricultural, mining, golf courses, public supply, commercial, recreational, hydropower, thermo power, and nuclear power activities.

Capacity Use Program

As authorized under the Groundwater Use Act, the Department may declare and delineate capacity use areas after receiving a request and conducting an investigation. Capacity use areas are areas in which the state determines, due to increasing demand and/or potential salt water intrusion, that the use of groundwater requires coordination and regulation for protection of the interests and rights of residents or property owners of these areas or of the public interest.

The Groundwater Use Act requires large groundwater users to obtain a permit to construct a well and to withdraw, utilize, or obtain groundwater in designated capacity use areas if specified threshold limits are exceeded. These threshold limits are one-hundred thousand (100,000) gallons per day on any one day, one million (1,000,000) gallons during any one month, and ten million (10,000,000) gallons during any one year. In addition to other conditions permit holders are required to report the amount of groundwater pumped.

Wetlands

In the §401 water quality certification process, applications for wetland alterations may be denied or modified due to the special nature of a wetland or the functions that a wetland provides. Wetland impacts must be compensated through restoration, enhancement, preservation, or creation and protected in perpetuity. Future development would be prohibited in these legally protected mitigation areas. Knowledge of areas that are restricted from development due to mitigation or special water classification is useful in planning future development in a watershed. The list of outstanding resource waters (ORW) has been refined to include wetlands that qualify for, and should be afforded, the highest level of protection. In addition, wetlands that are not currently classified as ORW, but meet certain criteria (e.g., absence of dischargers, endangered species, federal lands) will be noted as potential ORW candidates. In cooperation with the S.C. Department of Natural Resources's Division of Land Resources and Conservation Districts, Landsat Thematic Mapper (TM) satellite image data will provide an inventory of wetlands in the basin and an image-based geographical information system (GIS) for subsequent monitoring and tracking efforts.

Shellfish Harvesting Waters

South Carolina's coastal area consists of 579,691 acres of surface water with an assigned classification designated for the harvest of molluscan shellfish. This coastal area is divided into 23 shellfish management areas with a total of 468 monitoring stations. The purpose of this monitoring network is to provide data which accurately reflects the sanitary conditions of coastal shellfish and shellfish growing waters in South Carolina to ensure that the health of shellfish consumers is protected. All shellfish waters receive one of the following harvest classifications.

Approved area classification shall be determined upon a sanitary survey which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. Growing areas shall be classified "approved" when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption.

Conditionally approved growing areas are subject to temporary conditions of actual or potential pollution. When such events are predictable as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department, prior to classifying an area as "conditionally approved." Shellfish shall not be directly marketed from a "conditionally approved" area until conditions for an "approved" classification have been met for a time that should insure the shellfish are safe for consumption. Shellstock from "conditionally approved" areas which have been subjected to temporary conditions of actual or potential pollution may be relayed to "approved" areas for purification or depurated through controlled purification operations only by special permit issued by the Department.

Restricted growing areas show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a "conditionally approved" area classification is not feasible. Shellfish may be harvested from areas classified as "restricted" only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision.

Conditionally restricted growing areas are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall

runoff, discharge of a major river or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as "conditionally restricted." Shellfish may be harvested from areas classified as "conditionally restricted" only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision.

Prohibited growing areas include those for which there is no current sanitary survey, or for which monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area, or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

Evaluation of growing areas is conducted annually; routine monitoring is conducted monthly. Sampling sites are shown on maps in the Watershed Assessments portion of this report. For current information on growing area classifications, contact DHEC's Shellfish Sanitation Program at 803-740-1590 (Charleston) or 803-734-5232 (Columbia).

Wasteload Allocation

A wasteload allocation (WLA) is the portion of a stream's assimilative capacity for a particular pollutant which is allocated to an existing or proposed point source discharge. Existing WLAs are updated during the basin review process and included in permits during the normal permit expiration and reissuance process. New WLAs are developed for proposed projects seeking a discharge permit or for existing discharges proposing to increase their effluent loading at the time of application. Wasteload allocations for oxygen demanding parameters are developed by the Water Quality Modeling Section, and WLAs for toxic pollutants and metals are developed by the appropriate permitting division.

The ability of a stream to assimilate a particular pollutant is directly related to its physical and chemical characteristics. Various techniques are used to estimate this capacity. Simple mass balance/dilution calculations may be used for a particular conservative (nondecaying) pollutant while complex models may be used to determine the fate of nonconservative pollutants that degrade in the environment. Waste characteristics, available dilution and the number of discharges in an area may, along with existing water quality, dictate the use of a simple or complex method of analysis. Projects which generally do not require complex modeling include: groundwater remediation, noncontact cooling water, mine dewatering, air washers, and filter backwash.

Streams are designated either effluent limited or water quality limited based on the level of treatment required of the dischargers to that particular portion of the stream. In cases where the USEPA published effluent guidelines, the minimum treatment levels required by law are sufficient to maintain instream water quality standards, and the stream is said to be effluent limited. Streams lacking the assimilative capacity for a discharge at minimum treatment levels are said to be water quality limited.

Permitting

The Water Facilities Permitting Division and the Industrial, Agricultural, and Stormwater Permitting Division are responsible for drafting and issuing National Pollutant Discharge Elimination System (NPDES) permits. A completed draft permit is sent to the permittee, to the SCDHEC District office, and if it is a major

permit, to the USEPA for review. When the permit draft is finalized, a public notice is issued. Major NPDES reissued permits are individually public noticed in a newspaper of general circulation and minor NPDES reissued permits are individually public noticed by posting in accordance with Regulation 61-9. New NPDES permits and modifications of existing NPDES permits are issued as the need arises, and are public noticed by newspaper advertisement and site posting. Comments from the public are considered and, if requested, a public hearing may be arranged. Both oral and written comments are collected at the hearing, and after considering all information, the Department staff makes the decision whether to issue the permit as drafted, to issue a modified permit, or to deny the permit. Everyone who participated in the process receives a copy of the final staff decision. It is anticipated that minor permits will be grouped by watershed and publicly noticed together; major permits will individually stand public review. Staff decisions may be appealed according to the procedures in Regulation 61-72.

The permitting divisions use general permits with statewide coverage for certain categories of minor NPDES permits. Discharges covered under general permits include utility water, potable surface water treatment plants, potable groundwater treatment plants with iron removal, petroleum contaminated groundwater, and mine dewatering activities. Additional activities proposed for general permits include bulk oil terminals, aquacultural facilities, and ready-mix concrete/concrete products. Land application systems for land disposal and lagoons are also permitted.

Stormwater

Stormwater discharges result from precipitation during rain events. Runoff washes pollutants associated with industrial activities (including construction activity), agricultural operations, and commercial and household sites directly into streams, or indirectly into drainage systems that eventually drain into streams. The SCDHEC Stormwater Permitting Program focuses on pollution prevention to reduce or eliminate stormwater pollution. The Department has general permitting authority for stormwater discharges associated with industrial activity, including construction. General permits SCR000000 and SCR100000 for industrial and construction activities, respectively, require permittees to develop and implement stormwater pollution prevention plans that establish best management practices to effectively reduce or eliminate the discharge of pollutants via stormwater runoff. The Stormwater and Agricultural Permitting Section is responsible for issuing NPDES storm water permits to prevent degradation of water quality as well as for issuing sediment and erosion control permits for land disturbance pursuant to the State Stormwater Management and Sediment Reduction Act. SCDHEC-OCRM manages sediment and erosion control in the coastal area.

Nonpoint Source Pollution Control

Nonpoint source pollutants are generally introduced to a waterbody during a storm event from diverse areas. Nonpoint source contributions originate from a variety of activities that include agriculture, silviculture, construction, urban stormwater runoff, hydrologic modification, landfills, mining, and residual wastes.

Section 319 of the 1987 Amendments to the Clean Water Act required states to assess the nonpoint source water pollution associated with surface and groundwater within their borders and then develop and implement a management strategy to control and abate the pollution. The first Assessment of Nonpoint Source

Pollution in South Carolina accomplished this purpose. With the results of the Assessment, the NPS Management Program developed strategies and targeted waterbodies for priority implementation of management projects. The priority list has been updated several times since then. Comprehensive projects are currently being implemented in a number of these watersheds. Components of the projects vary depending on the particular NPS impacts in the watershed, but may include BMP demonstrations, education, and monitoring.

The conventional §319 NPS Management Program has typically involved SCDHEC program areas or large institutional cooperators such as Clemson Extension Service and the Department of Natural Resources undertaking large scale projects. This effort continues through our annual grant award process. To diversify participation in the program, the Department has allocated a portion of §319 funds to institute a grants program known as Minigrants. In keeping with the Department's vision statement "Local Solutions to Local Problems", this program seeks to gain the involvement of smaller organizations like local governments, nonprofit organizations, and schools in NPS projects that are locally focused and generally smaller in scale.

Section 6217 of the 1990 Coastal Zone Act Reauthorization Amendments (CZARA) requires states with federally approved Coastal Zone Management Programs to develop Coastal Nonpoint Source Pollution Control Programs. At the federal level, the program is administered and funded jointly by the National Oceanic and Atmospheric Administration (NOAA) and EPA. In South Carolina, the Department's Office of Ocean and Coastal Resource Management (OCRM) and the Bureau of Water are responsible for development and implementation of the program. The Department submitted a State Nonpoint Source Pollution Management Program to meet the requirements of §6217 and §319, in October 1995.

The purpose of the Program is to insure the protection and restoration of the state's waters from nonpoint source water pollution impacts. The plan document describes programs (both regulatory and voluntary) for NPS abatement, targets watersheds for NPS project implementation, and describes the state's strategy under each of the eight categories of NPS sources identified in South Carolina. In each of the categorical sections management measures are described. Management measures are defined in §6217 as "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution". The management measures address the following major categories: agriculture, forestry, urban areas, marinas/recreational boating, hydromodification, mining, land application of wastes, and wetlands. The Nonpoint Source Management Program initiates NPS projects during the implementation phase of a targeted basin in accordance with the Watershed Water Quality Management Strategy.

South Carolina Water Watch

South Carolina Water Watch is a unique effort to involve the public and local communities in water quality protection. The Water Watch program was developed to encourage South Carolina's citizens to become stewards of the state's lakes, rivers, streams, estuaries, and wetlands. Volunteers select a water resource on which to focus and perform activities aimed at protecting water quality, such as shoreline surveys, public education, and litter cleanups. The Water Watch coordinator assists participants with materials and training to help make projects successful. SCDHEC invites individuals, school groups, civic organizations, businesses,

and local governments to learn about and protect the quality of our waterways by contacting the Water Watch coordinator at 803-734-5300.

Implementation Process for Impaired Waters

Under section 303(d) of the Federal Clean Water Act, each state is required to provide a comprehensive inventory of impaired waters for which existing required pollution controls are not stringent enough to achieve State water quality standards. This biennial list, commonly referred to as the “303(d) list”, is the basis for targeting waterbodies for watershed-based solutions.

A Total Maximum Daily Load (TMDL) is a means for recommending controls needed to meet water quality standards in a particular water or watershed. Historically, the typical TMDL has been developed as a wasteload allocation, considering a particular waterbody segment, for a particular point source, to support setting effluent limitations. Now, in order to address the combined cumulative impacts of all sources, broad watershed-based TMDLs will be developed. A TMDL may also include an unallocated portion of capacity reserved as a margin of safety.

The TMDL process is linked to all other State water quality activities. Water quality impairments are identified through monitoring and assessment. Watershed-based investigations result in source identification and TMDL development. TMDLs form links between water quality standards and point and nonpoint source controls. Where TMDLs are established, they constitute the basis for NPDES permits, and for strategies to reduce nonpoint source pollution. The effectiveness and adequacy of applied controls are evaluated through continued monitoring and assessment.

WATER QUALITY INDICATORS

Water quality data are used to describe the condition of a waterbody, to help understand why that condition exists, and to provide some clues as to how it may be improved. Water quality indicators include physical, chemical, and biological measurements.

Macroinvertebrate Community

Macroinvertebrates are aquatic insects and other aquatic invertebrates associated with the substrates of streams, rivers, and lakes. Macroinvertebrates can be useful indicators of water quality because these communities respond to integrated stresses over time which reflect fluctuating environmental conditions. Community responses to various pollutants (e.g. organic, toxic, and sediment) may be assessed through interpretation of diversity, known organism tolerances, and in some cases, relative abundances and feeding types.

Fish Tissue

Many pollutants occur in such low concentrations in the water column that they are usually below analytical detection limits. Over time many of these chemicals may accumulate in fish tissue to levels that are easily measured. By analyzing fish tissue it is possible to see what pollutants may be present in waterbodies

at very low levels. This information can also be used to determine if consumption of the fish pose any undue human health concerns and to calculate consumption rates that are safe.

Dissolved Oxygen

Oxygen is essential for the survival and propagation of aquatic organisms. If the amount of oxygen dissolved in water falls below the minimum requirements for survival, aquatic organisms or their eggs and larvae may die. A severe example is a fish kill. Dissolved oxygen (DO) varies greatly due to natural phenomena, resulting in daily and seasonal cycles. Different forms of pollution also can cause declines in DO.

Changes in DO levels can result from temperature changes or the activity of plants and other organisms present in a waterbody. The natural diurnal (daily) cycle of DO concentration is well documented. Dissolved oxygen concentrations are generally lowest in the morning, climbing throughout the day due to photosynthesis and peaking near dusk, then steadily declining during the hours of darkness.

There is also a seasonal DO cycle in which concentrations are greater in the colder, winter months and lower in the warmer, summer months. Streamflow (in freshwater) is lower during the summer and greatly affects flushing, reaeration, and the extent of saltwater intrusion, all of which affect dissolved oxygen values.

Biochemical Oxygen Demand

Five-day biochemical oxygen demand (BOD₅) is a measure of the amount of dissolved oxygen consumed by the decomposition of carbonaceous and nitrogenous matter in water over a five-day period. The BOD₅ test indicates the amount of biologically oxidizable carbon and nitrogen that is present in wastewater or in natural water. Matter containing carbon or nitrogen uses dissolved oxygen from the water as it decomposes, which can result in a dissolved oxygen decline. The quantity of BOD₅ discharged by point sources is limited through the National Pollutant Discharge Elimination System (NPDES) permits issued by the Department. The discharge of BOD₅ from a point source is restricted by the permits so as to maintain the applicable dissolved oxygen Standard.

pH

pH is a measure of the hydrogen ion concentration of water, and is used to indicate degree of acidity. The pH scale ranges from 0 to 14 standard units (SU). A pH of 7 is considered neutral, with values less than 7 being acidic, and values greater than 7 being basic.

Low pH values are found in natural waters rich in dissolved organic matter, especially in Coastal Plain swamps and black water rivers. The tannic acid released from the decomposition of vegetation causes the tea coloration of the water and low pH.

High pH values in lakes during warmer months are associated with high phytoplankton (algae) densities. The relationship between phytoplankton and daily pH cycles is well established. Photosynthesis by phytoplankton consumes carbon dioxide during the day, which results in a rise in pH. In the dark, phytoplankton respiration releases carbon dioxide. In productive lakes, carbon dioxide decreases to very low levels, causing the pH to rise to 9-10 SU; hence, excursions of pH beyond Standards may be the result of natural conditions. Continuous flushing in streams prevents the development of significant phytoplankton populations and the resultant chemical changes in water quality.

Fecal Coliform Bacteria

Coliform bacteria are present in the digestive tract and feces of all warm-blooded animals, including humans, poultry, livestock, and wild game species. Fecal coliform bacteria are themselves generally not harmful, but their presence indicates that surface waters may contain pathogenic microbes. Diseases that can be transmitted to humans through water contaminated by improperly treated human or animal waste are the primary concern. At present, it is difficult to distinguish between waters contaminated by animal waste and those contaminated by human waste.

Public health studies have established correlations between fecal coliform numbers in recreational and drinking waters and the risk of adverse health effects. Based on these relationships, the USEPA and SCDHEC have developed enforceable standards for surface waters to protect against adverse health effects from various recreational or drinking water uses. Proper waste disposal or sewage treatment prior to discharge to surface waters minimizes this type of pollution.

Nutrients

Oxygen demanding materials and plant nutrients are the most common substances discharged to the environment by man's activities, through wastewater facilities and by agricultural, residential, and stormwater runoff. The most important plant nutrients, in terms of water quality, are phosphorus and nitrogen. In general, increasing nutrient concentrations are undesirable due to the potential for accelerated growth of aquatic plants, including algae. Nuisance plant growth can create imbalances in the aquatic community, as well as aesthetic and access issues. High densities of phytoplankton (algae) can cause wide fluctuations in pH and dissolved oxygen. South Carolina has no official standards or criteria for nutrients in water; however, the USEPA has issued recommendations for phosphorus concentrations to prevent over-enrichment.

The forms of nitrogen routinely analyzed at SCDHEC stations are ammonia and ammonium (NH_3/NH_4), total Kjeldahl nitrogen (TKN), and nitrite and nitrate (NO_2/NO_3). Ammonia and ammonium are readily used by plants. TKN is a measure of organic nitrogen and ammonia in a sample. Nitrate is the product of aerobic transformation of ammonia, and is the most common form used by aquatic plants. Nitrite is usually not present in significant amounts.

Total phosphorus (TP) is commonly measured to determine phosphorus concentrations in surface waters. TP includes all of the various forms of phosphorus (organic, inorganic, dissolved, and particulate) present in a sample.

Turbidity

Turbidity is an expression of the scattering and absorption of light through water. The presence of clay, silt, fine organic and inorganic matter, soluble colored organic compounds, and plankton and other microscopic organisms increases turbidity. Increasing turbidity can be an indication of increased runoff from land. It is an important consideration for drinking water as finished water has turbidity limits. State water quality standards address turbidity in waters classified for Trout.

Total Suspended Solids

Total Suspended Solids (TSS) are the suspended organic and inorganic particulate matter in water. Although increasing TSS can also be an indication of increased runoff from land, TSS differs from turbidity in that it is a measure of the mass of material in, rather than light transmittance through, a water sample. High TSS can adversely impact fish and fish food populations and damage invertebrate populations. There are no explicit State Standards for TSS.

Heavy Metals

Concentrations of cadmium, chromium, copper, lead, mercury, nickel, and zinc in water are routinely measured by the Department to compare to State standards intended to protect aquatic life and human health. These metals occur naturally in the environment, and many are essential trace elements for plants and animals. Human activities, such as land use changes and industrial and agricultural processes, have resulted in an increased flux of metals from land to water. Atmospheric inputs are recognized as important sources of metals to aquatic systems. Metals are released to the atmosphere from the burning of fossil fuels (coal, oil, gasoline), wastes (medical, industrial, municipal), and organic materials. The metals are then deposited on land and in waterways from the atmosphere via rainfall.

ASSESSMENT METHODOLOGY

The Watershed Water Quality Management Strategy is a geographically-based document that describes, at the watershed level, water quality as well as conditions and activities related to water quality. This section provides an explanation of the information assessment methodology used to generate the watershed-level summaries. Water quality data used in this assessment are presented in Appendix B.

Use Support Determination

At the majority of SCDHEC's surface water monitoring stations, samples for analysis are collected as surface grabs once per month, quarter, or year, depending on the parameter. Grab samples collected at a depth of 0.3 meters are considered surface measurements, and are used to establish representative physical conditions and chemical concentrations in the waterbodies sampled. At most stations sampled by boat, dissolved oxygen and temperature are sampled as a water column profile, with measurements being made at a depth of 0.3 meters below the water surface and at one-meter intervals to the bottom. At stations sampled from bridges, these parameters are measured only at a depth of 0.3 meters. All water and sediment samples are collected and analyzed according to standard procedures. Macroinvertebrate community structure is analyzed routinely at selected stations as a means of detecting adverse biological impacts on the aquatic fauna due to water quality conditions which may not be readily detectable in the water column chemistry.

For the purpose of assessment, only results from surface samples are used in water quality standards comparisons and trend assessments. This information is considered to represent "average" conditions, as

opposed to extremes, because of the inability to target individual high or low flow events on a statewide basis. The more extreme instream chemical concentrations resulting from nonpoint source inputs from rain events or point source inputs of a variable nature are frequently missed because routine monthly sampling rarely coincides with the time of release. Results from water quality samples can be compared to State standards and USEPA criteria, with some restrictions due to time of collection and sampling frequency. The monthly sampling frequency employed in the ambient monitoring network may be insufficient for strict interpretation of standards. The USEPA does not define the sampling method or frequency other than indicating that it should be "representative". A grab sample is considered to be representative for indicating excursions relative to standards: a single grab sample is more representative of a one-hour average than a four-day average, more representative of a one-day average than a one-month average, and so on (see also Screening & Additional Considerations for Water Column Metals below). When the sampling method or frequency does not agree with the intent of the particular standard, conclusions about water quality should be considered as only an indication of conditions.

Aquatic Life Use Support

One important goal of the Clean Water Act and State Standards is to maintain the quality of surface waters to provide for the survival and propagation of a balanced indigenous aquatic community of fauna and flora. The degree to which aquatic life is protected (aquatic life use support) is assessed by comparing important water quality characteristics and the concentrations of potentially toxic pollutants with standards. Support of aquatic life uses is based on the percentage of standards excursions and, where data are available, the composition and functional integrity of the biological community. A number of waterbodies have been given site specific standards for pH and dissolved oxygen, which reflect natural conditions.

A dissolved oxygen (DO) criterion of 4 mg/l is used for Class SB, 6 mg/l for TN and TPGT, and 5 mg/l for all other Classes. An excursion is an occurrence of a DO concentration less than the stated criterion. For pH, there are several acceptable ranges applied depending on the Class of water: 6-8 SU for TPGT; 6-8.5 SU for FW; 5-8.5 SU for FW*; and 6.5-8.5 for SFH, SA, and SB. For DO and pH, if 10 percent or less of the samples contravene the appropriate standard, then aquatic life uses are said to be fully supported. A percentage of standards excursions between 11-25 is considered partial support, and a percentage greater than 25 is considered to represent nonsupport, unless excursions are due to natural conditions. pH may vary from the ranges specified in the standards due to a variety of natural causes.

When comparing SCDHEC data to DO standards, it is necessary to consider sampling bias due to season or tide stage. Samples are collected as a single instantaneous grab sample, which is not truly representative of the daily average used as the criterion for most classifications. Secondary stations are sampled only during summer months and generally experience a higher rate of DO excursions as a result. It is essential to examine the data to ascertain such patterns of excursions before summarily concluding that the indicated violations constitute poor water quality.

If the acute aquatic life standard is exceeded for any individual toxicant (heavy metals, priority pollutants, chlorine, ammonia) in more than 10 percent of the samples, aquatic life uses are not supported. If the acute aquatic life standard is exceeded more than once, but in less than or equal to 10 percent of the samples, uses are partially supported.

Since most toxicants are collected with less frequency than the physical parameters, some judgement must be used in applying this guidance (see also Screening & Additional Considerations for Water Column Metals below). If the sample size is small, as for annual sampling, a single sample above the acute standard constitutes more than 10 percent of the samples. In this instance, it is possible for a single sample to result in a conclusion that aquatic life uses are not supported, despite what other data suggests. In such a circumstance it is noted that aquatic life uses may not be fully supported and the site is prioritized for the collection of biological data, or additional monitoring and investigation, to verify the true situation.

Biological data are the ultimate deciding factor for aquatic life uses, regardless of chemical conditions. The goal of the standards is the protection of a balanced indigenous aquatic community.

Macroinvertebrate Data Interpretation

Macroinvertebrate community assessments are used, where available, to supplement or verify Aquatic Life Use Support determinations and to evaluate potential impacts from the presence of sediment contaminants. Aquatic and semi-aquatic macroinvertebrates are identified to the lowest practical taxonomic level depending on the condition and maturity of specimens collected. The EPT Index and the North Carolina Biotic Index are the main indices used in analyzing macroinvertebrate data. To a lesser extent taxa richness and sometimes total abundance may be used to help interpret data.

The EPT Index is a tabulation of taxa richness within the generally pollution sensitive groups. EPT values are compared with least impacted regional sites. The biotic index for a sample is the average pollution tolerance of all organisms collected, based on assigned taxonomic tolerance values. A database is currently being developed to establish significant EPT index levels to be used in conjunction with the biotic index to address aquatic life use support.

Taxa richness is the number of distinct taxa collected and is the simplest measure of diversity. High taxa richness is generally associated with high water quality. Increasing levels of pollution progressively eliminate the more sensitive taxa, resulting in lower taxa richness. Total abundance is the enumeration of all macroinvertebrates collected at a sampling location. This is generally not regarded as a qualitative metric. However, when gross differences in abundance occur between stations, this metric may be considered as a potential indicator.

Recreational Use Support

The degree to which the swimmable goal of the Clean Water Act is attained (recreational use support) is based on the frequency of fecal coliform bacteria excursions, defined as greater than 400/100 ml for all surface water Classes. Comparisons to the bacteria geometric mean standard are not considered appropriate based on sampling frequency and the intent of the standard. If 10 percent or less of the samples are greater than 400/100 ml then recreational uses are said to be fully supported. A percentage of standards excursions between 11-25% is considered partial support of recreational uses, and greater than 25% is considered to represent nonsupport of recreational uses.

Fish Consumption Use Support

The Department uses a risk-based approach to evaluate mercury concentrations in fish tissue and to issue consumption advisories in affected waterbodies. This approach contrasts the average daily exposure dose to the reference dose (RfD). Using these relationships, fish tissue data are interpreted by determining the consumption rates that would not be likely to pose a health threat to adult males and nonpregnant adult females. Because an acceptable RfD for developmental neurotoxicity has not been developed, pregnant women, infants, and children are advised to avoid consumption of fish from any waterbody where an advisory has been issued.

SCDHEC continues to issue fish consumption advisories for polychlorinated biphenyls (PCBs) based on the USFDA action level of 2.0 parts per million. The SCDHEC is, however, in the process of developing a risk based method for issuing future advisories.

Human Health Standards

State standards for human health are also evaluated in the preparation of the Watershed Water Quality Management Strategy assessments. For contaminants with human health standards (heavy metals, pesticides), a potential human health threat is indicated if the median concentration exceeds the standard.

Additional Screening and Prioritization Tools

Evaluation of water quality data and other supplemental information facilitates watershed planning. Information from the following sources is used to develop watershed-based protection and prevention strategies.

Long-Term Trend Assessment

As part of the watershed assessments, surface data from each station are analyzed for statistically significant long-term trends using a modification of Kendall's tau, which is a nonparametric test removing seasonal effects. Flows are not available for most stations, and the parametric concentrations are not flow-corrected. Seasonal Kendall's tau analysis is used to test for the presence of a statistically significant trend for a parameter, either increasing or decreasing, usually over a twelve- to fifteen-year period. It indicates whether the concentration of a given parameter is exhibiting consistent change in one direction over the specified time period. A two sided test at $\alpha=0.1$ is used to determine statistically significant trends, and the direction of trend. An estimate of the magnitude of any statistically significant trend is also calculated.

A rigorous evaluation for trends in time-series data usually includes a test for autocorrelation. The data are not tested for autocorrelation prior to the trend analysis. Autocorrelation should not seriously compromise a general characterization of water quality trends based on such a long series of deseasonalized monthly samples.

One of the advantages of the seasonal Kendall test is that values reported below detection limits (DL) are valid data points in this nonparametric procedure, since they are all considered to be tied at the DL value. When the DL changed during the period of interest, all values are considered to be tied at the highest DL occurring during that period. Since it is possible to measure concentrations equal to the value of the DL, values less than DL are reduced by subtraction of a constant so that they remain tied with each other, but are

less than the values equal to the DL. Since fecal coliform bacteria detection limits vary with sample dilution, there is no set DL; therefore, for values reported as less than some number, the value of the number is used.

Sediment Screening

There are no sediment standards; therefore, in order to identify sediments with elevated metals concentrations, percentiles are constructed using five years of statewide sediment data. Only values greater than the detection limit were used to construct the percentiles for chromium, copper, nickel, lead, and zinc. Because so few concentrations of cadmium and mercury are measured above the detection limit, all samples were pooled for these metals. A sediment metal concentration is considered to be high if it is in the top 10% of the pooled results, and very high if it is in the top 5%. Any analytical result above detection limits is flagged for pesticides, PCBs, and other priority pollutants. Sites with high metals concentrations or the occurrence of other contaminants above detection limits are prioritized for the collection of biological data, or additional monitoring and investigation, to verify the true situation.

Water Column Metals Analyses

The USEPA criteria for heavy metals to protect aquatic life are specified as a four-day average and a one-hour average, and have been adopted as State standards. Because of the quarterly sampling frequency for heavy metals, the USEPA advises against comparisons to chronic toxicity standards (four-day average concentration); therefore, only the acute standard (one-hour average) for the protection of aquatic life is used in the water quality assessment (see table next page).

Zinc and copper are elevated in surface waters statewide and concentrations are frequently measured in excess of the calculated acute aquatic life standards. To identify areas where zinc, copper, and other metals are above normal background concentrations, concentrations greater than the detection limit from all SCDHEC monitoring sites statewide for a five year period are pooled and the 90th and 95th percentiles are

| METAL STANDARDS IN WATER (MG/L) | | | | |
|--|--------------------------------|-------------------------------|------------------------------|---------------------|
| Metal | Present Detection Level | Freshwater 1-Hour Ave. | Saltwater 1-Hour Ave. | Human Health |
| *Cadmium | 10.0 | 1.79 | 43.0 | 5.000 |
| Chromium (VI) | 10.0 | 16.00 | 1100.0 | 50.000 |
| *Copper | 10.0 | 9.22 | 2.9 | |
| *Lead | 50.0 | 33.78 | 140.0 | 50.000 |
| Mercury | 0.2 | 2.40 | 2.1 | 0.153 |
| *Nickel | 20.0 | 789.00 | 75.0 | 4584.000 |
| *Zinc | 10.0 | 65.00 | 95.0 | |

* Freshwater Standards based on a hardness of 50 mg/l as CaCO₃.

computed. This is done separately for each metal for both fresh and saltwaters. The individual measurements from each monitoring station are then compared to these percentiles, as well as to State standards. As in sediments, a metal concentration is referred to as "high" if it is in the top 10% of the pooled results, and "very high" if it is in the top 5%. All water column values referred to as "high" or "very high" are also in excess of the acute aquatic life standard listed in the table above. For chromium, because so few concentrations are above the detection limit, all samples collected are used to generate the percentiles. Sites with high metals concentrations are prioritized for the collection of biological data, or additional monitoring and investigation, to verify the true situation.

The analytical procedures used by the Department yield total metal concentration, which is a relatively conservative measure, since the total metal concentration is always greater than the acid-soluble or dissolved fraction. Most heavy metal criteria for freshwater are calculated from formulas using water hardness. The formulas used to calculate criteria values are constructed to apply to the entire United States, including Alaska and Hawaii. As with all the USEPA criteria, there is also a large margin of safety built into the calculations. The applicability of the hardness-based criteria derived from the USEPA formulas to South Carolina waters has been a subject of much discussion. Hardness values vary greatly nationwide (from zero into the hundreds), with South Carolina representing the lower end of the range (statewide average value is approximately 20 mg/l). Representatives of the USEPA Region IV standards group have stated that no toxicity data for hardness values less than 50 mg/l were used in the development of the formulas. They have expressed reservations about the validity of the formulas when applied to hardness values below 50 mg/l. Based on this opinion, South Carolina's State standards for metals are based on a hardness of 50 mg/l for waters where hardness is 50 mg/l or less, resulting in several criteria values below the Department's current analytical detection limits. Therefore, any detectable concentration of cadmium, copper, or lead is an excursion beyond recommended criteria.

The SCDHEC monitoring data has historically indicated that zinc and copper levels in South Carolina waters are elevated relative to USEPA criteria, apparently a statewide phenomenon in both fresh and salt waters, and possibly resulting from natural conditions or nonpoint sources. These levels do not appear to adversely affect state fisheries, which suggests that the levels are the result of long-term local conditions to which the fauna have adapted, as opposed to point source pollution events. It is difficult to assess the significance of heavy metal excursions due to the questionable applicability of the formulas at low hardness values and calculated criteria below present detection limits.

Groundwater Contamination Inventory

A detailed accounting of groundwater contamination will be addressed in subsequent watershed strategy documents. The groundwater contamination inventory is used to identify groundwater-related problem areas. Sites in the inventory are updated annually.

Land Use/Land Cover Data

General land use/land cover data for South Carolina was derived from SPOT multispectral satellite images using image mapping software to inventory the State's land classifications, which are as follows.

Urban land is characterized by man-made structures and artificial surfaces related to industrial, commercial and residential uses, as well as vegetated portions of urban areas.

Agricultural/Grass land is characterized by cropland, pasture and orchards, and may include some grass cover in Urban, Scrub/Shrub and Forest areas.

Scrub/Shrub land is adapted from the western Rangeland classification to represent the "fallow" condition of the land (currently unused, yet vegetated), and is most commonly found in the dry Sandhills region including areas of farmland, sparse pines, regenerating forest lands and recently harvested timber lands.

Forest land is characterized by deciduous and evergreen trees not including forests in wetland settings.

Forested Wetland (swampland) is the saturated bottomland, mostly hardwood forests that are primarily composed of wooded swamps occupying river floodplains and isolated low-lying wet areas, primarily located in the Coastal Plain.

Nonforested Wetland (marshland) is dependent on soil moisture to distinguish it from Scrub/Shrub since both classes contain grasses and low herbaceous cover; nonforested wetlands are most common along the coast and isolated freshwater areas found in the Coastal Plain.

Barren land is characterized by an unvegetated condition of the land, both natural (rock, beaches and unvegetated flats) and man-induced (rock quarries, mines and areas cleared for construction in urban areas or clearcut forest areas).

Water (non-land) includes both fresh and tidal waters.

Slope and Erodibility Data

The slope values used in this strategy are approximate slopes derived by NRCS field personnel conducting soil surveys. The definition of soil erodibility differs from that of soil erosion. Soil erosion may be more influenced by slope, rainstorm characteristics, cover, and land management than by soil properties. Soil erodibility refers to the properties of the soil itself, which cause it to erode more or less easily than others when all other factors are constant. The soil erodibility factor, K, is the rate of soil loss per erosion index unit as measured on a unit plot, and represents an average value for a given soil reflecting the combined effects of all the soil properties that significantly influence the ease of soil erosion by rainfall and runoff if not protected. The K values in this assessment were derived from the Nonpoint Source Pollution Assessment, where values closer to 1.0 represent higher soil erodibility and a greater need for best management practices to minimize erosion and contain those sediments which do erode.

Public Participation

Public participation is an important component of SCDHEC's Watershed Water Quality Management Program. Workshops were held in several locations during strategy development to gain a better understanding of watershed residents' concerns. Additional benefits to this interaction on the local level include improved public awareness about SCDHEC water programs, and increased local interest and participation in water quality improvement. Meetings are summarized in Appendix A.

SAVANNAH AND SALKEHATCHIE RIVER BASINS

Together, the Savannah and Salkehatchie River basins incorporate some 5 million acres within the State of South Carolina. For this document, the basins are divided hydrologically into 4 watershed management units (WMU) that contain a total of 60 watershed units. The watershed units used are the USDA Natural Resource Conservation Service 11-digit codes for South Carolina. All water quality related evaluations are made at the watershed level. The stream names used are derived from USGS topo maps. Summaries of public workshops held within the Savannah and Salkehatchie River basins are contained in Appendix A.

Land Resources

The portion of the Savannah River basin within South Carolina as described in Watershed Management Units 0101, 0102 and 0103 (see map next page) encompasses 2,983,612 acres. Most (57%) of this area is forested; 15% is agricultural land, 14% is scrub land, 4% is forested wetland, 4% is urban land, 4% is water, 1% is barren land, and 1% is nonforested wetland. Urban land includes the Cities of Anderson, Aiken, and North Augusta.

The entire Salkehatchie River basin, described in Management Unit 0104, encompasses 2,127,766 acres of which 35% is forested land, 16% is forested wetland, 15% is agricultural land, 14% is scrub land, 10% is nonforested wetland, 7% is water, 3% is urban land, and 0.4% is barren land. Urban land includes Hilton Head Island and the Beaufort area.

Physiographic Regions

The State of South Carolina has been divided into six Major Land Resource Areas (MLRAs) by the USDA Soil Conservation Service. The MLRAs are physiographic regions that have soils, climate, water resources and land uses in common. The physiographic regions that define South Carolina are as follows:

The **Blue Ridge** is an area of dissected (separated by erosion into many closely spaced valleys), rugged mountains with narrow valleys dominated by forests; elevations range from 1,000 to 3,300 feet.

The **Piedmont** is an area of gently rolling to hilly slopes with narrow stream valleys dominated by forests, farms and orchards; elevations range from 375 to 1,000 feet.

The **Sand Hills** are an area of gently sloping to strongly sloping uplands with a predominance of sandy areas and scrub vegetation; elevations range from 250 to 450 feet.

The **Upper Coastal Plain** is an area of gentle slopes with increased dissection and moderate slopes in the northwestern section that contain the state's major farming areas; elevations range from 100 to 450 feet.

The **Lower Coastal Plain** is an area that is mostly nearly level and is dissected by many broad, shallow valleys with meandering stream channels; elevations range from 25 to 125 feet.

The **Coastal Zone** is a mostly tidally-influenced area that is nearly level and dissected by many broad, shallow valleys with meandering stream channels; most of the valleys terminate in tidal estuaries along the coast; elevations range from sea level to about 25 feet.

Soil Types

The dominant soil associations, or those soil series comprising, together, over 40% of the land area, were recorded for each watershed in percent descending order. The individual soil series for the Savannah and Salkehatchie River basins are described as follows.

Ailey soils are well drained loamy and sandy soils with clayey or loamy subsoil.

Albany soils are deep, somewhat poorly drained soils with sandy to loamy subsoil on nearly level terrain.

Argent soils are poorly drained soils on low, nearly level areas and low ridges.

Ashe soils are shallow to moderately deep, well drained to excessively drained soils in steep areas.

Bladen soils are poorly drained soils on low, nearly level areas and low ridges.

Blanton soils are excessively drained soils that have loamy subsoil or are sandy throughout.

Bohicket soils are very poorly drained soils, clayey throughout or mucky and underlain with clayey layers, frequently flooded.

Bonneau soils are deep, moderately well drained soils with loamy subsoil on ridges.

Capers soils are very poorly drained soils, clayey throughout or mucky, and underlain with clayey layers, frequently flooded.

Cataula soils are deep, gently sloping to strongly sloping, well drained soils with a loamy surface layer and a clayey subsoil.

Cecil soils are deep, well drained, gently sloping to sloping soils that have red subsoil.

Chastain soils are poorly drained to well drained soils that are clayey or loamy throughout and are subject to flooding.

Chewacla soils are nearly level, somewhat poorly drained and well drained soils.

Chipley soils are moderately to excessively well drained soils, sandy throughout, on high ridges.

Chisolm soils are deep, well to moderately drained soils with sandy to loamy subsoil on nearly level to gently sloping terrain.

Coosaw soils are somewhat to poorly drained soils, with a moderately thick sandy surface layer and loamy subsoil, on ridges and in depressions.

Coxville soils are deep, poorly drained soils in thick beds of clayey sediment, nearly level.

Davidson soils are deep, gently sloping to strongly sloping, well drained to somewhat poorly drained soils with a loamy surface layer and a clayey subsoil.

Dothan soils are well drained, sandy soils with loamy subsoil.

Echaw soils are well drained soils, sandy throughout on broad, nearly level to gently sloping ridges.

Fuquay soils are well drained, loamy and sandy soils with clayey or loamy subsoil.

Georgeville soils are gently sloping to sloping, well drained and moderately well drained soils.

Goldsboro soils are moderately well to poorly drained soils with loamy subsoil on nearly level ridges and in shallow depressions.

Goldston soils are dominantly sloping to steep, well drained to excessively drained soils.

Hayesville soils are moderately shallow to deep, well drained soils in gently sloping to steep areas, with red to yellow-brown subsoil.

Helena soils are gently sloping to sloping, moderately well drained to well drained soils.

Herndon soils are gently sloping to sloping, well drained and moderately well drained soils.

Hiwassee soils are well drained, moderately sloping soils with clayey subsoil, moderately deep.

Lakeland soils are well drained, sandy soils with loamy subsoil and excessively drained soils.

Lynchburg soils are moderately well to poorly drained soils, with loamy subsoil, on nearly level ridges and in shallow depressions.

Lynnhaven soils are poorly drained sandy soils, with sandy subsoil, in low areas, and prone to ponding.

Madison soils are well drained, moderately sloping soils, with clayey subsoil, moderately deep.

Norfolk soils are deep, well drained soils, with loamy subsoil, nearly level and gently sloping elevated uplands.

Ocilla soils are somewhat poorly to moderately well drained soils with a thick sandy surface layer and a loamy subsoil, or sandy throughout.

Ogeechee soils are poorly drained and moderately well drained, loamy soils with clayey or loamy subsoil, on terraces.

Okeetee soils are deep, somewhat poorly drained soils, with clayey subsoil, on broad low ridges.

Pacolet soils are well drained, moderately steep soils with clayey subsoil, moderately deep.

Paxville soils are somewhat to very poorly drained soils, with loamy subsoil, on low ridges and in depressions.

Pelham soils are deep, poorly drained soils with loamy subsoil on broad flats and in depressions.

Pungo soils are very poorly drained soils, mucky throughout or loamy and underlain with clayey layers, rarely or frequently flooded with freshwater.

Rains soils are moderately well to poorly drained soils, with a loamy subsoil, on nearly level ridges and in shallow depressions.

Saluda soils are excessively drained to well drained, strongly sloping to very steep soils.

Santee soils are very poorly drained soils on low nearly level areas.

Tatum soils are dominantly sloping to steep, well drained to excessively drained soils, with a loamy subsoil, moderately deep or shallow to weathered rock.

Tawcaw soils are poorly drained to well drained soils that are clayey or loamy throughout and are subject to flooding.

Torhunta soils are poorly drained soils, prone to flooding and ponding, with a loamy surface layer and subsoil, or are sandy throughout, on level areas.

Troup soils are well drained, sandy soils with loamy subsoil and excessively drained soils.

Varina soils are nearly level to sloping, well drained soils, with a sandy surface layer and a clayey or loamy subsoil.

Vaocluse soils are well drained, loamy and sandy soils with clayey or loamy subsoil.

Wahee soils are poorly drained soils on low, nearly level areas and low ridges.

Wilkes soils are dominantly strongly sloping to steep, well drained soils.

Water Resources

The **Savannah** River basin incorporates areas within the States of North Carolina, Georgia, and South Carolina, approximately 10,000 square miles, thus ranking it among the major watersheds of the Southeast. Geographic regions included in the Savannah River Watershed range from the Blue Ridge (mountain) through the Piedmont, and the Upper and Lower Coastal Plains to the Coastal Zone.

The Tallulah River and Chattooga River, originating in Georgia and North Carolina, respectively, join to form the Tugaloo River on the South Carolina/Georgia State border. The Horsepasture River flows into the Toxaway River which flows over the North Carolina State boundary into South Carolina, where it merges with the Whitewater River and Thompson River to form Lake Jocassee, the Keowee River and eventually Lake Keowee. The Seneca River flows out of Lake Keowee to converge with the Tugaloo River and form the headwaters of the Savannah River, which serves as the physical boundary between the States of South Carolina and Georgia. The Savannah River then flows through Lake Hartwell, Lake Richard B. Russell, and Lake Thurmond and empties into the Atlantic Ocean at the port city of Savannah, Georgia.

The **Salkehatchie** River basin is contained within South Carolina and is described in Watershed Management Unit 0104. The Salkehatchie River basin originates in the Sandhills region and flows through the Lower Coastal Plain and Coastal Zone regions. The Salkehatchie River joins with the Little Salkehatchie River to form the Combahee River, which empties into St. Helena Sound and the Atlantic Ocean. Also included in this basin grouping are drainages from the Ashepoo River, the Coosawhatchie River, Broad River, and the New River.

Watershed Assessments

Ambient surface water monitoring data from 64 primary stations, 44 secondary stations, 52 watershed stations, and 1 inactive station in the Savannah and Salkehatchie River basins were reviewed for this assessment, along with 72 biological sites to assess macroinvertebrate communities. The time period used to assess standards compliance was 1992 through 1996. Water quality data are summarized in Appendix B. All current NPDES permits in the Savannah and Salkehatchie River basins are to be drafted and issued by September 30, 1998, and will all be reissued together in 2003.

Management Unit WMU-0101

Management Unit WMU-0101 is located in the northwest corner of South Carolina and extends from a common border with North Carolina and Georgia southeast into Anderson County. It contains Oconee County and a portion of Pickens County as well.

Population. The 1990 populations and projections for the year 2010 for counties within WMU-0101 are listed in the table below. Oconee County is expected to experience the greatest population change during this time period, with an increase of 26%.

| <i>County</i> | <i>1990 Population</i> | <i>2010 Population</i> | <i>Change (%)</i> |
|----------------------|-------------------------------|-------------------------------|--------------------------|
| Anderson | 145,196 | 176,000 | 21 |
| Oconee | 57,494 | 72,300 | 26 |
| Pickens | 93,894 | 109,500 | 17 |

Climate. Normal yearly rainfall in the WMU-0101 area was 60.97 inches, according to the S.C. historic climatological record. Data compiled from National Weather Service stations in Longcreek, Salem, Walhalla, Clemson University and Pickens were used to determine the general climate information for the northwestern corner of the state. Within the four Savannah-Salkehatchie watershed management units, the highest level of rainfall occurred in WMU-0101, which is characteristic of the mountains and upper Piedmont region. The highest seasonal rainfall occurred in the spring with 17.29 inches; 14.88, 12.72 and 16.08 inches of rain fell in the summer, fall and spring, respectively. The average annual daily temperature was 59.7°F, the coolest in the state. Winter temperatures averaged 42.9°F, spring temperatures averaged 59.4°F and summer and fall mean temperatures were 75.6 and 60.8°F, respectively.

Fish Consumption Advisory. A fish consumption advisory has been issued by SCDHEC for **LAKE HARTWELL** advising people to limit the amount of fish consumed from these waters and their tributaries due to PCB and mercury contamination. In 1976, analysis of fish tissue by the SCDHEC and the USEPA revealed contamination by polychlorinated biphenyls (PCBs) above the USFDA recommended limits in certain areas of Lake Hartwell. As a result of these findings, a fish consumption advisory was issued for portions of Lake Hartwell to reduce human exposure. The SCDHEC and US Army Corps of Engineers have continued to conduct surveys of Lake Hartwell to evaluate PCB levels in fish tissue.

Portions of Lake Hartwell became eligible for Superfund support in 1990. The contamination originated from the historical industrial use of PCBs at the Cornell-Dubilier Marketing site, formerly owned by Sangamo, located on Town Creek. Contaminated sediments from this site have migrated downstream via Twelve Mile Creek to the Twelve Mile Creek Arm of Lake Hartwell which continues to have the highest level of PCBs. The manufacture and use of PCBs was banned in 1979, but PCBs are very resistant to degradation and therefore are very persistent in the environment.

A gradient of decreasing PCB concentration in fish tissue extends from the Twelve Mile Creek region down to the dam. The forage fish in the Twelve Mile Creek arm are highly contaminated with PCBs and play a major role in the accumulation of PCBs in the game fish population through the food chain.

Mercury has also been measured in fish tissue at levels that would warrant an advisory; however, the advisory issued due to PCBs is more restrictive and the original fish consumption advisory remains in effect. All fish taken from the Seneca River arm upstream of Highway 24 should be released and not eaten. All fish greater than three pounds taken from the remainder of Lake Hartwell should be released and not eaten. SCDHEC continues to issue fish consumption advisories for PCBs based on the USFDA action level of 2.0 parts per million. SCDHEC is, however, in the process of developing a risk based method for issuing future advisories.

03060101-020. Watershed 03060101-020 (map page 29) is located in Oconee and Pickens Counties and consists of **LAKE JOCASSEE** and its tributaries. The watershed includes the Toxaway River, Whitewater River and Thompson River, all which flow across the North Carolina border to form Lake Jocassee; the entire lake to the dam is included in the watershed.

The watershed occupies 39,724 acres of the Blue Ridge region of South Carolina. The predominant soil types consist of an association of the Ashe-Saluda series. The erodibility of the soil (K) averages 0.23; the slope of the terrain averages 45.2%, with a range of 10-65%. Land use/land cover in the watershed includes: 73% forested land, 22% water, 2% urban land, 2% scrub/shrub land, 1% agricultural land, and <1% barren land. The entire watershed is contained within Sumter National Forest.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)† |
|--|----------------------|------------------------|--------------|--------------------|
| SC0037800 | DUKE POWER/BAD CREEK | JOCASSEE LK | IN | 0.18 |
| SC0037800 | DUKE POWER/BAD CREEK | JOCASSEE LK | IN | 0.013 |
| SC0037800 | DUKE POWER/BAD CREEK | JOCASSEE LK | IN | 2.9 |
| SC0037800 | DUKE POWER/BAD CREEK | JOCASSEE LK | IN | ----- |
| SC0037800 | DUKE POWER/BAD CREEK | JOCASSEE LK | IN | 4.3 |
| *IN=industrial †MGD=million gallons per day | | | | |

| Monitoring Locations | | | |
|---|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| SV-335 | P | TPGT | Lake Jocassee at confluence of Toxaway, Horsepasture & Laurel Fork Creeks |
| SV-337 | P | TPGT | Lake Jocassee outside of coffer dam at Bad Creek Project |
| SV-336 | P | TPGT | Lake Jocassee at confluence of Thompson and Whitewater Rivers |
| SV-334 | P | TPGT | Lake Jocassee, main body of lake |
| * P=primary, S=secondary, SS=watershed | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

LAKE JOCASSEE is a 7565-acre impoundment on the Toxaway, Whitewater, and Thompson Rivers, with a maximum depth of approximately 324 feet (99 meters) and an average depth of approximately 157 feet (48 meters). A portion of the lake's watershed is in North Carolina. There are four monitoring sites on Lake Jocassee.

At the most uplake site (SV-335) aquatic life uses are not supported due to occurrences of copper and zinc in excess of the aquatic life acute standards, in addition to a high concentration of zinc and a very high concentration of lead measured in 1996. A significant increasing trend in dissolved oxygen concentration and a significant decreasing trend in total nitrogen concentration suggests improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Further down the lake (SV-337), aquatic life uses are fully supported, but may be threatened by a very high concentration of zinc measured in 1993 and a very high concentration of lead measured in 1995, compounded by a significant increasing trend in pH. A significant decreasing trend in turbidity suggest improving conditions for this parameter. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

At the next site down lake (SV-336), aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards. Recreational uses are fully supported at this site.

At the most down lake site (SV-334), aquatic life uses are fully supported. A significant increasing trend in dissolved oxygen concentration and a significant decreasing trend in total nitrogen concentration suggests improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Eutrophication assessments indicate that Lake Jocassee is one of the least eutrophic large lakes in South Carolina, characterized by very low nutrient concentrations and very clear water. Preservation of this lake's desirable trophic condition is recommended.

Duke Energy operates a hydroelectric facility on Lake Jocassee.

03060101-030. Watershed 03060101-030 (map page 29) is located in Oconee and Pickens Counties and consists of the upper region of **LAKE KEOWEE** and its tributaries. This watershed contains a total of 34.18 stream miles. **EASTATOE CREEK** receives drainage from **ROCKY BOTTOM CREEK** and **LITTLE EASTATOE CREEK**, and joins with the Keowee River just below the Lake Jocassee dam to form the upper region of Lake Keowee. The watershed includes the headwaters of Lake Keowee extending down to the Keowee dam, one of two dams on this reservoir.

The watershed occupies 75,177 acres of the Blue Ridge region of South Carolina. The predominant soil types consist of an association of the Pacolet-Ashe-Hayesville series. The erodibility of the soil (K) averages 0.23; the slope of the terrain averages 27.8%, with a range of 2-80%. Land use/land cover in the watershed includes: 78.98% forested land, 10.96% water, 6.38% agricultural land, 3.29% scrub/shrub land, 0.30% urban land, and 0.10% barren land. Keowee Toxaway State Park is located in the upper reaches of the watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|----------------------|------------------------|--------------|-------------------------------|
| SC0000515 | DUKE POWER/OCONEE NU | | IN | 2324.7 |
| SC0000515 | DUKE POWER/OCONEE NU | | IN | 3.7 |
| SC0000515 | DUKE POWER/OCONEE NU | | IN | 0.035 |
| SC0000515 | DUKE POWER/OCONEE NU | | IN | 0.007 |
| SC0000515 | DUKE POWER/OCONEE NU | | IN | 0.18 |
| SC0026557 | MCCALL ROYAL | REEDY CV CK | CO | 0.012 |

*IN=industrial, CO=community [†]MGD=million gallons per day

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| SV-741 | BIO | ORW | Eastatoe Creek at S-39-237 |
| SV-676 | BIO | ORW | Rocky Bottom Creek at US 178 |
| SV-230 | P | ORW | Eastatoe Creek at S-39-143 |
| SV-341 | SS/BIO | FW | Little Eastatoe Creek at S-39-49 |
| SV-338 | P | FW | Lake Keowee above SC Route 130 and dam |

| Monitoring Locations | | | |
|---|-------|--------------------|---------------------|
| Station Number | Type* | Class [†] | Station Description |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **ROCKY BOTTOM CREEK** (SV-676) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in upper **EASTATOE CREEK** (SV-741) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are not supported at the lower Eastatoe Creek site (SV-230) due to occurrences of zinc in excess of the aquatic life acute standards, including two very high concentrations. A significant increasing trend in dissolved oxygen concentration suggests improving conditions for this parameter. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **LITTLE EASTATOE CREEK** (SV-341). Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

LAKE KEOWEE is a 18,372-acre impoundment on the Keowee River, with a maximum depth of approximately 155 feet (47 meters) and an average depth of approximately 54 feet (17 meters). The lake's watershed comprises 273 square miles (707 km²) in North and South Carolina. Eutrophication assessments indicate that Lake Keowee is the least eutrophic large lake in South Carolina, characterized by very low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended. Aquatic life uses are not supported in Lake Keowee (SV-338) due to occurrences of copper in excess of the aquatic life acute standards, including a high concentration of copper measured in 1995, compounded by a significant increasing trend in pH. A significant increasing trend in dissolved oxygen concentration and a significant decreasing trend in five-day biochemical oxygen demand suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Duke Energy operates a hydroelectric facility on Lake Keowee within this watershed.

A nonpoint source (NPS) monitoring project has been implemented in this watershed by the Friends of Lake Keowee Society through SCDHEC. The goal of the project is NPS education in the community. The project involves volunteer monitoring using a periphyton biomass technique to infer possible nutrient increases due to NPS pollution. Sampling stations will be placed near potential NPS input locations such as marinas and golf courses as well as at control stations. Area high school students will become involved in sampling and analysis in the final stages of the project. Project grant period: 2/01/97-1/31/98.

03060101-040. Watershed 03060101-040 (map page 33) is located in Pickens, Oconee and Anderson Counties and consists of the **SENECA RIVER**, which together with its tributaries form the upper region of **LAKE HARTWELL**. The Seneca River flows out of the Keowee dam to form the headwaters of the Seneca River region of Lake Hartwell, which extends down to its confluence with the Tugaloo River region of the lake. This watershed accepts the drainage of **SIX MILE CREEK**, which flows into the Seneca River just below the Little River dam, and from **SIX AND TWENTY CREEK**, which enters the watershed just above the confluence with the Tugaloo River. Town Creek flows into Six and Twenty Creek. There are a total of 29.93 stream miles in

this watershed. Watershed 03060101-040 also accepts the drainage from Twelve Mile Creek (03060101-060,-070), Eighteen Mile Creek (03060101-090), Coneross Creek (03060101-080) and Lake Keowee (03060101-050) watersheds.

The watershed occupies 137,014 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 10.7%, with a range of 2-25%. Land use/cover in the watershed includes: 44% forested, 19% agricultural, 15% water, 13% scrub/shrub, 8% urban land, and 1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-----------------------|------------------------|--------------|-------------------------------|
| SC0000132 | AMERICAN HOUSE | PIKE CREEK | IN | 0.033 |
| SC0000272 | COURTENAY UTIL INC/W | LITTLE RV | CO | 0.0495 |
| SC0000591 | J P STEVENS/CLEMSON | | IN | 2.16 |
| SC0020010 | CLEMSON/MAIN PLANT | HARTWELL LK | MU | 1 |
| SC0021849 | HARBOR GATE CONDOMIN | HARTWELL LK | CO | 0.0375 |
| SC0021873 | SHOALS SEWER COMPANY | HARTWELL LK | CO | 0.019 |
| SC0022004 | CLEMSON UNIVER/CENTR | HARTWELL LK | IN | 14.11 |
| SC0023141 | ISSAQUEENA MOBILE HOM | HARTWELL LK | CO | 0.024 |
| SC0023311 | DAYS INN/I-85 & SC H | HARTWELL LK | CO | 0.025 |
| SC0023353 | MILLIKEN & CO/DEFORE | HARTWELL LK | IN | 0.014 |
| SC0023353 | MILLIKEN & CO/DEFORE | HARTWELL LK | IN | MR |
| SC0034843 | CLEMSON UNIVER/PHYSI | HARTWELL LK | CO | 1.8 |
| SC0036200 | CLEMSON UNIVER/COOPE | HARTWELL LK | IN | 0.003 |
| SC0038652 | DANIEL HIGH SCH/PICK | HARTWELL LK | CO | 0.02 |
| SC0040193 | ANDERSON CO SWR AUTH | SIX & TWENTY | MU | 0.5 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-249 | P | FW | Seneca River at SC 183, 3.8 miles WSW of Six Mile |
| SV-205 | SS/BIO | FW | Six Mile Creek at S-39-160 |
| SV-360 | SS | FW | Lake Issaqueena forebay equidistant from dam and shorelines |
| SV-106 | S | FW | Martin Creek arm of Lake Hartwell at S-37-65, N of Clemson |
| SV-236 | P | FW | Lake Hartwell at S-37-184, 6.5 miles SSE of Seneca |

| Monitoring Locations | | | |
|--|-------|--------|--|
| Station Number | Type* | Class† | Station Description |
| SV-288 | P | FW | L. Hartwell, Seneca R. Arm at USACE buoy betw. markers S-28A & S-29 |
| SV-181 | S | FW | 6 & 20 Creek at S-04-29, 8.2 miles SE of Pendleton |
| SV-339 | P | FW | L. Hartwell, Seneca R. Arm at USACE buoy betw. markers S-14 and S-15 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for PCBs and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0101).

Aquatic life uses are fully supported in the **SENECA RIVER** (SV-249), but may be threatened by a significant decreasing trend in dissolved oxygen concentration. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **SIX MILE CREEK** (SV-205) based on macroinvertebrate community, physical and chemical data. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

LAKE ISSAQUEENA (SV-360) is an 85-acre impoundment on Six Mile Creek, with a maximum depth of approximately 26 feet (8.0 meters) and an average depth of approximately nine feet (2.7 meters). Eutrophication assessments indicate that Lake Issaqueena is one of the least eutrophic small lakes in South Carolina, characterized by low nutrient concentrations and clear water. Preservation of this lake's desirable trophic condition is recommended. Aquatic life uses are fully supported in Lake Issaqueena (SV-360), but may be threatened by a very high concentration of zinc measured in 1996. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **SIX AND TWENTY CREEK** (SV-181). A significant decreasing trend in total phosphorus concentration suggests improving conditions for this parameter. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

LAKE HARTWELL is a 56,000-acre impoundment on the Savannah River, with a maximum depth of approximately 175 feet (53 meters) and an average depth of approximately 46 feet (14 meters). The lake's watershed comprises 2090 square miles (5400 km²) in Georgia and South Carolina. There are four monitoring sites on Lake Hartwell in this watershed unit.

At the most uplake site (SV-106), aquatic life uses are fully supported, but may be threatened by significant decreasing trends in dissolved oxygen concentration and pH, and a significant increasing trend in

turbidity. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

At the next site down the lake (SV-236), aquatic life uses are fully supported, but may be threatened by significant decreasing trends in dissolved oxygen concentration and pH. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Further down the lake (SV-288) aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards, including a high concentration of copper in water measured in 1995. This is compounded by a significant decreasing trend in dissolved oxygen concentration and the measurement in sediment of four very high concentrations of chromium, one very high concentration of lead, one high and one very high concentration of nickel, and two high and two very high concentrations of zinc. Also in sediment P,P' DDE, a metabolite of DDT, was measured once, toxaphene was measured once, PCB-1242 was measured once, PCB-1248 was measured twice, and PCB-1254 was measured three times. Although the use of DDT was banned in 1973, and the manufacture and use of PCBs was banned in 1979, both are very resistant to degradation and therefore are very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

At the most down lake site (SV-339), aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards, compounded by a very high concentration of lead measured in 1994. A significant decreasing trend in five-day biochemical oxygen demand suggests improving conditions for this parameter. Recreational uses are fully supported at this site.

Eutrophication assessments indicate that Lake Hartwell is one of the least eutrophic large lakes in South Carolina, characterized by low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended.

A nonpoint source demonstration project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to demonstrate best management practices (BMPs) for logging site preparation for re-planting trees. Before and after runoff samples are collected to show effectiveness of the BMPs. A program to educate loggers about these BMPs is part of the project. The project period is May 1995 through April 1998.

03060101-050. Watershed 03060101-050 (map page 37) is located in Oconee County and consists primarily of the **LITTLE RIVER** and its tributaries, which form an arm of **LAKE KEOWEE**. In this watershed, Oconee Creek and North Fork Creek join to form the Little River. A large portion of Lake Keowee, from the Keowee dam to the Little River dam, is contained in this watershed. Cane Creek and Little Cane Creek,

together with Crooked Creek, form arms of Lake Keowee. The tributaries of Lake Keowee extend for a total of 59.59 stream miles.

The watershed occupies 104,698 acres of the Blue Ridge and Piedmont regions of South Carolina. The predominant soil types consist of an association of the Pacolet-Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.24; the slope of the terrain averages 19.3%, with a range of 2-80%. Land use/land cover in the watershed includes: 68% forested land, 12% agricultural land, 12% water, 4% urban land, 3% scrub/shrub land, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|---|----------------------|------------------------|--------------|-------------------------------|
| SC0022322 | LAKE KEOWEE DEVELOPM | KEOWEE LK | CO | 0.9 |
| SC0026603 | SALEM HI&ELEM SCH | N FORK | CO | 0.011 |
| SC0026727 | TAMASSEE DAR SCHOOL | DAVEY BR | CO | 0.031 |
| *IN=industrial, CO=community [†] MGD=million gallons per day | | | | |

| Monitoring Locations | | | |
|---|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-743 | BIO | FW | Flat Shoals River at S-37-129 |
| SV-742 | BIO | FW | Oconee Creek at S-37-129 |
| SV-203 | S | FW | Little River at S-37-24, 7.1 miles NE of Walhalla |
| SV-312 | P | FW | Lake Keowee at SC 188, Crooked Creek arm, 4.5 miles N of Seneca |
| SV-343 | SS/BIO | FW | Little Cane Creek at S-37-133 |
| SV-342 | SS/BIO | FW | Cane Creek at S-37-133 |
| SV-311 | P | FW | Lake Keowee at SC 188, Cane Creek arm, 3.5 miles NW of Seneca |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **FLAT SHOALS RIVER** (SV-743) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **OCONEE CREEK** (SV-742) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life and recreational uses are fully supported in **LITTLE RIVER** (SV-203). Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters.

Aquatic life uses are fully supported in **LITTLE CANE CREEK** (SV-343) based on macroinvertebrate community, physical and chemical data. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

Aquatic life uses are fully supported in **CANE CREEK** (SV-342) based on macroinvertebrate community, physical and chemical data. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

LAKE KEOWEE is a 18,372-acre impoundment on the Keowee River, with a maximum depth of approximately 155 feet (47 meters) and an average depth of approximately 54 feet (17 meters). The lake's watershed comprises 273 square miles (707 km²) in North and South Carolina. There are two monitoring sites on Lake Keowee in this watershed unit.

At the uplake site (SV-312), aquatic life uses are fully supported. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations, and turbidity suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

At the down lake site (SV-311), aquatic life uses are only partially supported due to occurrences of zinc in excess of the aquatic life acute standards, including two very high concentrations, compounded by a very high concentration of copper measured in 1996 and a significant decreasing trend in dissolved oxygen concentration. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Eutrophication assessments indicate that Lake Keowee is the least eutrophic large lake in South Carolina, characterized by very low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended.

Duke Energy operates a hydroelectric facility on Lake Keowee within this watershed.

A nonpoint source (NPS) monitoring project has been implemented in this watershed by the Friends of Lake Keowee Society through SCDHEC. The goal of the project is NPS education in the community. The project involves volunteer monitoring using a periphyton biomass technique to infer possible nutrient increases due to NPS pollution. Sampling stations will be placed near potential NPS input locations such as marinas and golf courses as well as at control stations. Area high school students will become involved in sampling and analysis in the final stages of the project. Project grant period: 2/01/97-1/31/98.

03060101-060. Watershed 03060101-060 (map page 40) is located in Pickens County and consists of the upper reach of **TWELVE MILE CREEK** and its tributaries. Middle Fork Twelve Mile Creek and **NORTH FORK TWELVE MILE CREEK** join to form Twelve Mile Creek, which flows through the watershed and is joined, along the way, by Town Creek, Wolf Creek and Rices Creek; the drainage from all these streams flows into the lower reaches of Twelve Mile Creek (03060101-070), and into Lake Hartwell. There are a total of 51.64 stream miles in this watershed.

The watershed occupies 74,972 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee-Pacolet series. The erodibility of the soil (K-factor) averages 0.25; the slope of the terrain averages 13.7%, with a range of 2-80%. Land use/land cover in the watershed includes: 64% forested land, 24% agricultural land, 6% urban land, 5% scrub/shrub land, <1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-------------------------------|------------------------|--------------|-------------------------------|
| SC0000370 | ALICE MFG/ELLJEAN | RICES CK | IN | 0.04 |
| SC0000370 | ALICE MFG/ELLJEAN | RICES CK | IN | 0.022 |
| SC0000370 | ALICE MFG/ELLJEAN | RICES CK | IN | 0.032 |
| SC0000434 | SPANGLERS GROCERY | PRATERS CK | IN | 0.009 |
| SC0021661 | PICKENS/TOWN CREEK | TOWN CK | MU | 0.6 |
| SC0021679 | PICKENS/WOLF CREEK | WOLF CK | MU | 0.5 |
| SC0026492 | RYOBI MOTOR PRODUCTS | TOWN CK | IN | MR |
| SC0047716 | PICKENS/12 MILE CK (proposed) | 12 MILE CK | MU | 1 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| SV-206 | S/BIO | FW | North Fork Twelve Mile Creek at US 178, 2.9 miles N of Pickens |
| SV-282 | S | FW | Twelve Mile Creek at S-39-273, 2.8 miles SSW of Pickens |
| SV-740 | BIO | FW | Rices Creek at S-39-158 |
| SV-739 | BIO | FW | Twelve Mile Creek at S-39-137 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for PCBs and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0101).

Aquatic life uses are fully supported in **NORTH FORK TWELVE MILE CREEK** (SV-206) based on macroinvertebrate community data, but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

Aquatic life and recreational uses are fully supported in **TWELVE MILE CREEK** (SV-282). Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. In sediment, PCB-1254 is routinely detected. The manufacture and use of PCBs was banned in 1979, but it is very resistant to degradation and therefore very persistent in the environment.

Aquatic life uses are fully supported in **RICES CREEK** (SV-740) based on macroinvertebrate community data. Recreational use support was not assessed.

03060101-070. Watershed 03060101-070 (map page 42) is located in Pickens County and consists of the lower reach of **TWELVE MILE CREEK** and its tributaries. The lower reach of Twelve Mile Creek flows into and forms an arm of Lake Hartwell. **GOLDEN CREEK** flows into this segment of Twelve Mile Creek near the Towns of Liberty and Easley. This watershed contains a total of 18.97 stream miles, and accepts the drainage of the upper Twelve Mile Creek watershed (03060101-060).

The watershed occupies 30,279 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 9.6%, with a range of 2-25%. Land use/land cover in the watershed includes: 57% forested land, 20% urban land, 12% agricultural land, 8% scrub/shrub land, 2% water, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)[†] |
|-----------------|----------------------|------------------------|-------------------|--------------------------|
| SC0000302 | BASF CORPORATION | HUGGINS CK | IN | 0.427 |
| SC0000302 | BASF CORPORATION | TWELVE MILE | IN | 0.1415 |
| SC0022012 | CATEECHEE VILLAGE | 12 MILE CK | CO | 0.02 |
| SC0023035 | EASLEY/GOLDEN CREEK | GOLDEN CK | MU | 0.58 |
| SC0024996 | CENTRAL/NORTH PLANT | 12 MILE CK | MU | 0.15 |
| SC0026166 | LIBERTY/CRAMER | MURPHEE BR | MU | 0.157 |
| SC0026191 | LIBERTY/ROPER LAGOON | GOLDEN CK | MU | 0.5 |
| SC0027049 | MASSINGILL TRAILER | 12 MI CK TR | CO | 0.0024 |
| SC0028762 | R C EDWARDS JR HS | HARTWELL LK | CO | 0.015 |
| SC0039586 | IMPERIAL DIE CASTING | GOLDEN CK | IN | 0.002 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|--|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| SV-239 | S | FW | Golden Creek at S-39-222, 1.2 miles NW of Liberty |
| SV-738 | BIO | FW | Golden Creek at Golden Creek Rd |
| SV-015 | S | FW | Twelve Mile Creek at S-39-51, N of Norris |
| SV-137 | S | FW | Twelve Mile Creek at S-39-337 |
| SV-136 | S | FW | First creek after leaving Central at culvert on Maw Bridge Road |
| SV-107 | S | FW | Twelve Mile Creek at SC 133 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for PCBs and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0101).

Aquatic life uses are fully supported in **GOLDEN CREEK** (SV-239), but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Further downstream (SV-738), aquatic life uses are only partially supported based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in an unnamed creek outside of Central (SV-136), but may be threatened by a significant decreasing trend in dissolved oxygen concentration. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

There are four monitoring sites on **TWELVE MILE CREEK** in this watershed unit. At the upstream site (SV-739) aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

Further downstream (SV-015), aquatic life uses are fully supported, but may be threatened by a significant increasing trend in turbidity. In sediment, a very high concentration of cadmium was measured in 1994, and PCB-1254 was measured in 1992 and 1995. The manufacture and use of PCBs was banned in 1979, but it is very resistant to degradation and therefore very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest

improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the next site downstream (SV-137), aquatic life uses are fully supported. In sediment, very high concentrations of cadmium were measured in 1992 and 1993, PCB-1248 was measured in 1995, and PCB-1254 was measured in 1992, 1993 and 1994. The manufacture and use of PCBs was banned in 1979, but it is very resistant to degradation and therefore very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the most downstream site (SV-107), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in dissolved oxygen concentration. In sediment, high concentrations of chromium and nickel were measured in 1993, P,P' DDD and P,P' DDE, metabolites of DDT, were each measured once, ethion was measured in 1993, PCB-1242 was measured in 1994, PCB-1016 was measured in 1993, and PCB-1254 has been measured in every sample analyzed. Although the use of DDT was banned in 1973, and the manufacture and use of PCBs was banned in 1979, both are very resistant to degradation and therefore are very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Consolidated Hydro operates two hydroelectric facilities on Twelve Mile Creek.

03060101-080. Watershed 03060101-080 (map page 46) is located in Oconee County and consists of **CONEROSS CREEK** and its tributaries, which form an arm of Lake Hartwell. There are a total of 38.72 stream miles in this watershed. Richmond Creek, East Fork Creek, Colonels Fork Creek and Millers Branch drain into Coneross Creek, which flows past the Town of Walhalla and into Lake Hartwell.

The watershed occupies 61,871 acres of the Blue Ridge and Piedmont regions of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 11.1%, with a range of 2-25%. Land use/land cover in the watershed includes: 46% forested land, 26% agricultural land, 14% scrub/shrub land, 13% urban land, 1% water, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* (MGD)[†] |
|-----------------|---------------------|----------------------------|---|
| SC0033553 | OCONEE COUNTY SEWER | CONEROSS CK | MU 5 |

| Permit # | Facility | Receiving Water | Flow Type* (MGD)[†] |
|---|-----------------|----------------------------|---|
| *IN=industrial, CO=community, MU=municipal | | | |
| [†] MGD=million gallons per day, MR=monitor and report | | | |

| Monitoring Locations | | | |
|---|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| SV-333 | P | FW | Coneross Creek at S-37-13 |
| SV-004 | P | FW | Coneross Creek at SC 59 |
| SV-322 | I | FW | Coneross Creek arm of Lake Hartwell at S-37-54 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate, I=inactive | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are three monitoring sites on **CONEROSS CREEK**. At the upstream site (SV-333), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen concentration suggests improving conditions for this parameter. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

Further downstream (SV-004) aquatic life uses are fully supported. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

At the most downstream site (SV-322, see map for watershed 03060101-040) aquatic life uses are fully supported. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

Potential nonpoint source problems in the watershed include runoff from steep-sloped orchards and pastures without adequate vegetation, improper disposal of dead poultry, and over application of manure to farmland. A nonpoint source pollution reduction project has been implemented by SC Department of Natural Resources through SCDHEC. The goal of the project is to reduce sediment, nutrients, and chemical runoff from cropland, orchards, pastures and poultry operations in the watershed. Programs and practices to be implemented include education, demonstration, training and technical assistance about sustainable agriculture, vegetated field borders, filter strips, riparian zones, conservation tillage, and composting. SCDHEC is providing monitoring. The project period extends through May 1998.

03060101-090. Watershed 03060101-090 (map page 49) is located in Pickens and Anderson Counties and consists of **EIGHTEEN MILE CREEK** and its tributaries, which form an arm of Lake Hartwell. There are a total of 26.59 stream miles in the watershed. Fifteen Mile Creek, Brushy Creek, and **WOODSIDE**

BRANCH flow into Eighteen Mile Creek near the Towns of Central and Norris; and Eighteen Mile Creek flows past the Town of Pendleton en route to Lake Hartwell.

The watershed occupies 42,802 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 9.2%, with a range of 2-25%. Land use/land cover in the watershed includes: 50% forested land, 21% agricultural land, 19% scrub/shrub land, 9% urban land, 1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)[†] |
|-----------------|----------------------|------------------------|-------------------|--------------------------|
| SC0000264 | GREENWOOD MILLS | 18 MILE CK | IN | 0.387 |
| SC0000477 | MILLIKEN & CO | 18 MILE CK | IN | 3 |
| SC0025003 | CENTRAL/SOUTH PLANT | 18 MILE CK | MU | 0.35 |
| SC0026174 | LIBERTY/LUSK | WOODSIDE BR | MU | 0.281 |
| SC0026182 | LIBERTY/OWENS LAGOON | MOHASCO BR | MU | 0.072 |
| SC0026387 | CENTRAL WESLEYAN COL | 18 MILE CK | CO | 0.03 |
| SC0028703 | WHISPERING PINES SD | 18 MI CK TR | CO | 0.12 |
| SC0029548 | HEATHERWOOD SD | 18 MILE CK | CO | 0.072 |
| SC0035700 | PENDLETON-CLEMSON RE | 18 MILE CK | MU | 1.725 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-017 | S | FW | Eighteen Mile Creek at unnumbered Co Rd, 2.25 miles SSW of Easley |
| SV-241 | S | FW | Woodside Branch at US 123, 1.5 miles E of Liberty |
| SV-245 | S | FW | Eighteen Mile Creek at S-39-27, 3.3 miles S of Liberty |
| SV-135 | P/BIO | FW | Eighteen Mile Creek at S-39-93, SW of Central |
| SV-268 | P | FW | Eighteen Mile Creek at 2-04-1098 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **WOODSIDE BRANCH** (SV-241). A significant increasing trend in dissolved oxygen concentration and significant decreasing trends in five-day biochemical oxygen demand, total phosphorus concentration and turbidity suggest improving conditions for these parameters. Recreational uses are not supported at this site, however a significant decreasing trend in fecal coliform bacteria

concentration suggests improving conditions for this parameter. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

There are four monitoring sites on **EIGHTEEN MILE CREEK**. At the most upstream site (SV-017), aquatic life uses are fully supported. A significant increasing trend in dissolved oxygen concentration and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site, however a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the next site downstream (SV-245), aquatic life uses are fully supported. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site, however a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Further downstream (SV-135), aquatic life uses are fully supported based on macroinvertebrate community data, but may be threatened due to occurrences of zinc in excess of the aquatic life acute standards, including a high concentration measured in 1994, compounded by a significant decreasing trend in pH, a significant increasing trend in turbidity, and a very high concentration of chromium measured in 1996. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the most downstream site (SV-268), aquatic life uses are fully supported, but may be threatened by significant increasing trends in total nitrogen concentration and turbidity. In sediment, a very high concentration of zinc was measured in 1993 and a high concentration was measured in 1996. A significant increasing trend in dissolved oxygen concentration suggests improving conditions for this parameter. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Phased TMDLs have been developed for biochemical oxygen demand and phosphorus in Eighteen Mile Creek to address dissolved oxygen and eutrophication concerns.

03060101-100. Watershed 03060101-100 (map page 49) is located in Pickens and Anderson Counties and consists primarily of **THREE AND TWENTY CREEK** and its tributaries, which form an arm of Lake Hartwell. There are a total of 44.89 stream miles in the watershed. Pickens Creek, Double Branch, Cuffle

Creek, Little Garvins Creek, Big Garvins Creek, Shanklin Creek and Milwee Creek all drain into Three and Twenty Creek, which flows through the Town of LaFrance before entering the lake.

The watershed occupies 49,913 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 9.5%, with a range of 2-25%. Land use/land cover in the watershed includes: 39% forested land, 36% agricultural land, 22% scrub/shrub land, 1% urban land, 1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|---------------------------|------------------------|--------------|-------------------------------|
| SC0000485 | LAFRANCE MILLS (proposed) | 3 & 20 CK | IN | 1.4 |
| SC0000485 | LA FRANCE IND | 3 & 20 CK | IN | 0.49 |
| SC0000485 | LAFRANCE MILLS (proposed) | 3 & 20 CK | IN | 1.5 |
| SC0000485 | LAFRANCE MILLS (proposed) | 3 & 20 CK | IN | 1.6 |
| SC0026701 | MICHELIN TIRE | 3 & 20 CK | IN | 0.48 |
| SC0039543 | YODER BROTHERS ,INC | SHANKLIN CK | IN | MR |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|-----------------------------------|
| Station Number | Type* | Class[†] | Station Description |
| SV-735 | BIO | FW | Three and Twenty Creek at S-04-29 |
| SV-111 | S | FW | Three & Twenty Creek at S-04-280 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **THREE AND TWENTY CREEK**. At the upstream site (SV-735), aquatic life uses are only partially supported based on macroinvertebrate community data. Recreational use support was not assessed.

Further downstream (SV-111), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen concentration and a significant decreasing trend in five-day biochemical oxygen demand suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03060102-030. This watershed (map page 53) is located in Oconee County and consists primarily of the **CHATTOOGA RIVER** and its tributaries. There are a total of 11.62 stream miles contained in this watershed. A segment of the Chattooga River, which is a National Wild and Scenic River, crosses the North Carolina border and flows through this watershed. The **EAST FORK CHATTOOGA RIVER** also crosses the North Carolina State line and joins the Chattooga. Streams draining into the East Fork Chattooga River include Slatten Branch, Bad Creek, Dark Creek, and Jack Creek. Ira Branch enters the Chattooga River, as does King Creek. Pig Pen Branch flows into Lick Log Creek.

The watershed occupies 15,258 acres of the Blue Ridge region of South Carolina. The predominant soil types consist of an association of the Saluda-Ashe-Hayesville series. The erodibility of the soil (K) averages 0.21; the slope of the terrain averages 43.0%, with a range of 10-80%. Land use/land cover in the watershed includes: 92% forested land, 6% agricultural land, 1% scrub/shrub land, <1% water, and <1% urban land. Sumter National Forest extends across the entire watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)[†] |
|-----------------|-------------------|------------------------|-------------------|--------------------------|
| SC0000451 | US WILDLIFE SERV. | E FORK CHAT. | IN | NO FLOW |
| SC0000451 | US WILDLIFE SERV. | E FORK CHAT. | IN | 3 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-308 | S/BIO | ORW | East Fork of Chattooga River at SC 107, 2 miles S of state line |
| SV-227 | P/BIO | ORW | Chattooga River at SC 28, 3.5 miles NW of Mountain Rest |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **EAST FORK OF THE CHATTOOGA RIVER** (SV-308) based on macroinvertebrate community data, but may be threatened by a significant increasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **CHATTOOGA RIVER** (SV-227) based on macroinvertebrate community data, but may be threatened due to occurrences of copper and zinc in excess of the aquatic life acute standards, including a high concentration of zinc measured in 1993, a very high concentration of chromium measured in 1993, compounded by significant increasing trends in pH and turbidity and a very high concentration of cadmium measured in sediment in 1993. Recreational uses are fully supported at this site.

This watershed contains an abundance of confined poultry operations. A nonpoint source demonstration project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to demonstrate best management practices related to proper disposal and utilization of poultry litter. Monitoring of soils for nutrient content and recommendations to farmers for application are components of the project. The project period was November 1993 through August 1997.

03060102-060. Watershed 03060102-060 (map page 53) is located in Oconee County and consists primarily of the **CHATTOOGA RIVER** and its tributaries. This section of the Chattooga River flows through **TUGALOO LAKE** and dam, and then through **LAKE YONAH** to the Tugaloo River and headwaters of **LAKE HARTWELL**. The watershed contains a total of 48 stream miles. Moss Mill Creek enters the Chattooga River upstream of Brasstown Creek. Brasstown Creek flows into the Tugaloo River just below the Lake Yonah dam.

The watershed occupies 60,892 acres of the Blue Ridge region of South Carolina. The predominant soil types consist of an association of the Hayesville-Saluda-Pacolet series. The erodibility of the soil (K) averages 0.22; the slope of the terrain averages 27.7%, with a range of 10-80%. Land use/land cover in the watershed includes: 78% forested land, 11% scrub/shrub land, 8% agricultural land, 2% water, <1% urban land, and <1% barren land. Sumter National Forest extends across all but the lowest end of the watershed.

There are no permitted discharges in this watershed in South Carolina.

| Monitoring Locations | | | |
|--|-------|--------|--|
| Station Number | Type* | Class† | Station Description |
| SV-199 | P | ORW | Chattooga River at US Route 76 |
| SV-359 | SS | FW | Tugaloo Lake, forebay equidistant from spillway and shorelines |
| SV-358 | SS | FW | Lake Yonah, 50% between center of spillway and opposite shore |
| SV-673 | BIO | FW | Brasstown Creek at S-37-48 |
| SV-200 | S | FW | Tugaloo River Arm of Lake Hartwell at US 123 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for PCBs and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0101).

Aquatic life uses are fully supported in the **CHATTOOGA RIVER** (SV-199), but may be threatened by significant increasing trends in pH and total phosphorus. Recreational uses are fully supported at this site.

TUGALOO LAKE (SV-359) is a 300-acre impoundment on the Chattooga River, with an average depth of approximately 60 feet (18.3 meters). Eutrophication assessments indicate that Tugaloo Lake is one of the

least eutrophic small lakes in South Carolina, characterized by very low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended. Aquatic life and recreational uses are fully supported in Tugaloo Lake. North Georgia Hydro Project operates a hydroelectric facility on Tugaloo Lake.

LAKE YONAH (SV-258) is a 200-acre impoundment on the Tugaloo River, with a maximum depth of approximately 67 feet (20.4 meters) and an average depth of approximately 32 feet (9.8 meters). Eutrophication assessments indicate that Lake Yonah is the least eutrophic small lake in South Carolina, characterized by very clear water, very low nutrient concentrations, and high dissolved oxygen levels. Preservation of this lake's desirable trophic condition is recommended. Aquatic life and recreational uses are fully supported in Lake Yonah. North Georgia Hydro Project operates a hydroelectric facility on Lake Yonah.

Aquatic life uses are fully supported in **BRASSTOWN CREEK** (SV-673) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life and recreational uses are fully supported in **LAKE HARTWELL** (SV-200). Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters.

This watershed contains an abundance of confined poultry operations. A nonpoint source demonstration project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to demonstrate best management practices related to proper disposal and utilization of poultry litter. Monitoring of soils for nutrient content and recommendations to farmers for application are components of the project. The project period was November 1993 through August 1997.

03060102-120. Watershed 03060102-120 (map page 53) is located in Oconee County and consists primarily of the **CHAUGA RIVER** and its tributaries. There are a total of 53.92 stream miles in the watershed. The Chauga River flows into the Tugaloo River at the headwaters of Lake Hartwell. Jerry Creek flows into the Chauga River, as does Toxaway Creek just prior to the confluence of the Chauga and Tugaloo Rivers.

The watershed occupies 70,539 acres of the Blue Ridge region of South Carolina. The predominant soil types consist of an association of the Pacolet-Hayesville-Madison series. The erodibility of the soil (K) averages 0.23; the slope of the terrain averages 22.3%, with a range of 6-80%. Land use/land cover in the watershed includes: 77% forested land, 14% scrub/shrub land, 7% agricultural land, 1% urban land, <1% water, and <1% barren land. Sumter National Forest extends across all but the lowest end of the watershed. Oconee State Park lies within the Sumter National Forest in the upper region of the watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* (MGD)[†] |
|------------------|-----------------------------|----------------------------|---|
| SC0024872 | SC DEPT PRT/OCONEE S | JERRY CK | CO 0.06 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|-------|--------------------|--------------------------|
| Station Number | Type* | Class [†] | Station Description |
| SV-675 | BIO | ORW | Chauga River at S-37-193 |
| SV-344 | SS | FW | Chauga River at S-37-34 |
| SV-225 | BIO | FW | Toxaway Creek at S-37-34 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on the **CHAUGA RIVER**. At the upstream site (SV-675), aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed. Further downstream (SV-344), aquatic life and recreational uses are fully supported.

Aquatic life uses are fully supported in **TOXAWAY CREEK** (SV-225) based on macroinvertebrate community data. Recreational use support was not assessed.

This watershed contains an abundance of confined poultry operations. A nonpoint source demonstration project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to demonstrate best management practices related to proper disposal and utilization of poultry litter. Monitoring of soils for nutrient content and recommendations to farmers for application are components of the project. The project period was November 1993 through August 1997.

03060102-130. Watershed 03060102-130 (map page 57) is located in Oconee and Anderson Counties and consists primarily of the Tugaloo River and its tributaries. The Tugaloo River flows through the watershed and combines with the Seneca River (03060101-040) to form the headwaters of the Savannah River, which creates the headwaters of Lake Hartwell. **NORRIS CREEK** flows into **CHOESTOE CREEK** near the Town of Westminster; Choestoea Creek and Little Choestoea Creek flow into the Tugaloo River and the headwaters of Lake Hartwell. There are a total of 13.87 stream miles in this watershed. This watershed also accepts the drainage from watersheds 03060102-060, -120 and -150.

The watershed occupies 53,600 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Madison-Hiwassee series. The erodibility of the soil (K) averages 0.25; the slope of the terrain averages 13.2%, with a range of 2-25%. Land use/land cover in the watershed includes: 29% forested land, 21% scrub/shrub land, 21% agricultural land, 17% water, 7% barren land, and 5% urban land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD) [†] |
|-----------|---------------|-----------------|------------|--------------------|
| SC0022063 | NACO CAROLINA | HARTWELL LK | CO | 0.02 |
| SC0022357 | FOXWOOD HILLS | HARTWELL LK | CO | 0.1 |
| SC0026638 | SC HWY DEPT | HARTWELL LK | CO | 0.018 |

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-------------------|------------------------|--------------|-------------------------------|
| SC0033944 | OAKWAY ELEM & MDL | Little Choestoea | CO | 0.015 |
| SC0037877 | WESTMINSTER/WATER | CHOESTOEAK CK | IN | MR |
| SC0038644 | WEST-OAK HS | HARBIN CK | CO | 0.032 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-301 | S | FW | Norris Creek at S-37-435, 1 mile S of Westminster |
| SV-108 | SS/BIO | FW | Choestoea Creek at S-37-49 |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

Aquatic life uses are fully supported in **NORRIS CREEK** (SV-301), but may be threatened by a significant decreasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

Aquatic life uses are fully supported in **CHOESTOEAK CREEK** (SV-108) based on macroinvertebrate community, physical and chemical data. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

This watershed contains an abundance of confined poultry operations. A nonpoint source demonstration project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to demonstrate best management practices related to proper disposal and utilization of poultry litter. Monitoring of soils for nutrient content and recommendations to farmers for application are components of the project. The project period was November 1993 through August 1997.

03060102-150. Watershed 03060102-150 (map page 57) is located in Oconee and Anderson Counties and consists primarily of **BEAVERDAM CREEK** and its tributaries. The Beaverdam Creek watershed consists of Beaverdam Creek and Little Beaverdam Creek, which form arms of Lake Hartwell. There are a total of 19.39 stream miles in this watershed.

The watershed occupies 36,687 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. Soil erodibility (K) averages 0.26; the slope

of the terrain averages 9.8%, with a range of 2-25%. Land use/land cover in the watershed includes: 46% agricultural land, 20% scrub/shrub land, 20% forested land, 7% water, 4% barren land, and 3% urban land.

There are no permitted discharges in this watershed in South Carolina.

| Monitoring Locations | | | |
|---|--------|--------|----------------------------|
| Station Number | Type* | Class† | Station Description |
| SV-345 | SS/BIO | FW | Beaverdam Creek at S-37-66 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are only partially supported in **BEAVERDAM CREEK** (SV-345) based on macroinvertebrate data. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

This watershed contains an abundance of confined poultry operations. A nonpoint source demonstration project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to demonstrate best management practices related to proper disposal and utilization of poultry litter. Monitoring of soils for nutrient content and recommendations to farmers for application are components of the project. The project period was November 1993 through August 1997.

Management Unit WMU-0102

Management Unit WMU-0102 is located in the western portion of South Carolina and extends along a common border with Georgia from Anderson County into Edgefield County. It contains McCormick County and portions of Abbeville, Greenwood, and Saluda Counties as well.

Population. The 1990 populations and projections for the year 2010 for counties within WMU-0102 are listed in the table below. Edgefield County is expected to experience the greatest population change during this time period, with an increase of 34%. A decrease of 12% is expected in McCormick County.

| <i>County</i> | <i>1990 Population</i> | <i>2010 Population</i> | <i>Change (%)</i> |
|----------------------|-------------------------------|-------------------------------|--------------------------|
| Abbeville | 23,862 | 28,100 | 18 |
| Anderson | 145,196 | 176,000 | 21 |
| Edgefield | 18,375 | 24,600 | 34 |
| Greenwood | 59,567 | 69,200 | 16 |
| McCormick | 8,868 | 7,800 | -12 |

| County | 1990 Population | 2010 Population | Change (%) |
|---------------|------------------------|------------------------|-------------------|
| Saluda | 16,357 | 18,800 | 15 |

Climate. Data from National Weather Service stations in Anderson, Anderson FAA Airport, West Pelzer, Calhoun Falls, Greenwood, Lake Thurmond dam, Edgefield and McCormick were compiled to determine seasonal climatic information for the WMU-0102 area. Historical climatological records were compiled to provide the normal values. The normal annual rainfall in the WMU-0102 region was 48.18 inches. The highest seasonal rainfall occurred in the spring with 13.68 inches; the average summer, fall and winter rainfalls were 11.95, 9.80 and 12.75 inches, respectively. The mean annual daily temperature was 61.1 °F. On a seasonal basis, spring temperatures averaged 60.8 °F and summer, fall and winter temperatures averaged 77.9, 62.2 and 43.6 °F, respectively.

Fish Consumption Advisory. A fish consumption advisory has been issued by SCDHEC for **LAKE HARTWELL** advising people to limit the amount of fish consumed from these waters and their tributaries due to PCB and mercury contamination. In 1976, analysis of fish tissue by the SCDHEC and the USEPA revealed contamination by polychlorinated biphenyls (PCBs) above the USFDA recommended limits in certain areas of Lake Hartwell. As a result of these findings, a fish consumption advisory was issued for portions of Lake Hartwell to reduce human exposure. The SCDHEC and US Army Corps of Engineers have continued to conduct surveys of Lake Hartwell to evaluate PCB levels in fish tissue.

Portions of Lake Hartwell became eligible for Superfund support in 1990. The contamination originated from the historical industrial use of PCBs at the Cornell-Dubilier Marketing site, formerly owned by Sangamo, located on Town Creek. Contaminated sediments from this site have migrated downstream via Twelve Mile Creek to the Twelve Mile Creek embayment, which continues to have the highest level of PCBs in Lake Hartwell. The manufacture and use of PCBs was banned in 1979, but PCBs are very resistant to degradation and therefore are very persistent in the environment.

A gradient of decreasing PCB concentration in fish tissue extends from the Twelve Mile Creek region down to the dam. The forage fish in the Twelve Mile Creek arm are highly contaminated with PCBs and play a major role in the accumulation of PCBs in the game fish population through the food chain.

Mercury has also been measured in fish tissue at levels that would warrant an advisory, however the advisory issued due to PCBs is more restrictive and the original fish consumption advisory remains in effect. All fish taken from the Seneca River arm upstream of Highway 24 should be released and not eaten. All fish greater than three pounds taken from the remainder of Lake Hartwell should be released and not eaten. The SCDHEC continues to issue fish consumption advisories for PCBs based on the USFDA action level of 2.0 parts per million. The SCDHEC is, however, in the process of developing a risk based method for issuing future advisories.

03060103-020. Watershed 03060103-020 (map page 61) is located in Anderson County and consists primarily of the lower end of **LAKE HARTWELL** on the South Carolina side of the state boundary, which includes the Hartwell dam; no major streams flow through the watershed. Sadlers Creek State Park on Lake Hartwell is near the dam.

The watershed occupies 12,528 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Madison-Pacolet series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 11.5%, with a range of 2-40%. Land use/land cover in the watershed includes: 31% water, 27% agricultural land, 26% forested land, 14% scrub/shrub land, 2% urban land, and <1% barren land.

There are no permitted discharges in this watershed in South Carolina.

| Monitoring Locations | | | |
|---|-------|--------|--|
| Station Number | Type* | Class† | Station Description |
| SV-340 | P | FW | Lake Hartwell, main body at USACE buoy between markers 11 & 12 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for PCBs and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0102).

LAKE HARTWELL is a 56,000-acre impoundment on the Savannah River, with a maximum depth of approximately 175 feet (53 meters) and an average depth of approximately 46 feet (14 meters). The lake's watershed comprises 2090 square miles (5400 km²) in Georgia and South Carolina. Eutrophication assessments indicate that Lake Hartwell is one of the least eutrophic large lakes in South Carolina, characterized by low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended. Aquatic life uses are not supported in Lake Hartwell (SV-340) due to occurrences of copper in excess of the aquatic life acute standard. Recreational uses are fully supported at this site.

The U.S. Army Corps of Engineers operates a hydroelectric facility on Lake Hartwell.

03060103-030. Watershed 03060103-030 (map page 61) is located in Anderson and Abbeville Counties and consists primarily of **LAKE RICHARD B. RUSSELL** and its tributaries. The Savannah River flows out of Lake Hartwell dam and through Lake Richard B. Russell. Flowing into the Savannah River below Hartwell dam, and prior to Lake Russell, is the **BIG GENEROSTEE CREEK** drainage (Devil's Fork Creek, Richland Creek and Mountain Creek), and farther downstream at the headwaters of Lake Russell, the Little Generostee Creek drainage (Canoe Creek, East Prong Creek, and Crooked Creek) enters. The watershed includes all of Lake Russell on the South Carolina side to the Richard B. Russell dam, including the Rocky River arm of the lake which extends up to, but does not include, Lake Secession. There are a total of 157.1 stream miles in the watershed.

The watershed occupies 138,716 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee-Davidson series. The erodibility of the soil (K-

factor) averages 0.26; the slope of the terrain averages 9.9%, with a range of 2-15%. Land use/land cover in the watershed includes: 41% forested land, 23% scrub/shrub land, 20% agricultural land, 8% urban land, 8% water, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|---------------------|------------------------|--------------|-------------------------------|
| SC0000281 | BASF CORP/ANDERSON | GENEROSTEE C | IN | MR |
| SC0000281 | BASF CORP/ANDERSON | GENEROSTEE C | IN | 0.66 |
| SC0000281 | BASF CORP/ANDERSON | GENEROSTEE C | IN | MR |
| SC0000299 | FIELDCREST CANNON | R. B. RUSSELL | IN | 0.7 |
| SC0000299 | FIELDCREST CANNON | | IN | ----- |
| SC0023752 | ANDERSON/GENEROSTEE | GENEROSTEE | MU | 6.2 |
| SC0024716 | CHAMBERT FOREST SD | MOUNTAIN CK | CO | 0.03 |
| SC0024716 | CHAMBERT FOREST SD | MOUNTAIN CK | CO | 0.04 |
| SC0025828 | IVA | E PRONG CK | MU | 0.378 |
| SC0044881 | AMERADA HESS #40233 | WHITNER CK | IN | 0.007 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| SV-316 | S | FW | Big Generostee Creek at S-04-104 |
| SV-101 | BIO | FW | Big Generostee Creek at SC 187 |
| SV-100 | P | FW | Lake Russell at SC 181, 6.5 miles SW of Starr |
| SV-109 | BIO | FW | Little Generostee Creek at SC 184 |
| SV-357 | SS | FW | L. Russell, Rocky R. arm between markers 48 & 49, downstream of Felkel |
| SV-098 | P | FW | Lake Russell at SC 72, 3.1 miles SW of Calhoun Falls |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **BIG GENEROSTEE CREEK**. At the upstream site (SV-316), aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen concentration and significant decreasing trends in five-day biochemical oxygen demand, total phosphorus concentration, and turbidity suggests improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class

B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the downstream site (SV-101), aquatic life uses are only partially supported based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **LITTLE GENEROSTEE CREEK** (SV-109) based on macroinvertebrate community data. Recreational use support was not assessed.

LAKE RICHARD B. RUSSELL is a 26,650-acre impoundment on the Savannah River, with a maximum depth of approximately 147 feet (45 meters) and an average depth of approximately 39 feet (12 meters). The lake's watershed comprises 2900 square miles (7500 km²) in Georgia and South Carolina. There are three monitoring sites on Lake Russell.

At the most uplake site (SV-100), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in dissolved oxygen concentration and a significant increasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Further down the lake (SV-357), aquatic life uses are fully supported, but may be threatened by a high concentration of zinc measured in 1996. Recreational uses are fully supported at this site.

At the most down-lake site (SV-098), aquatic life uses are fully supported. In sediment, the pesticides endosulfan sulfate, malathion, and diazinon were measured in the 1994 sample. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations, as well as turbidity, suggests improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Eutrophication assessments indicate that Lake Russell is one of the least eutrophic large lakes in South Carolina, characterized by low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended.

The U.S. Army Corps of Engineers operates a hydroelectric facility on Lake Russell.

03060103-070. Watershed 03060103-070 (map page 68) is located in Anderson and Abbeville Counties and consists primarily of the **ROCKY RIVER** and its tributaries. The Rocky River watershed includes **BROADWAY LAKE**, and farther downstream, **LAKE SECESSION**. The river flows past the Town of Anderson and eventually forms an arm of Lake Richard B. Russell. The watershed contains a total of 97.7 stream miles. At the top of the watershed, Beaverdam Creek flows through the Anderson Reservoir and joins the Rocky River, as does Little Beaverdam Creek in a separate drainage.

The **BROADWAY CREEK** drainage includes **CUPBOARD CREEK**, Pea Creek and Neals Creek and forms Broadway Lake, which flows into and joins with the Rocky River to form Lake Secession. Also draining into the Rocky River prior to the headwaters of Lake Secession is the Hen Coop Creek drainage (**CHEROKEE CREEK**) and the Bear Creek and Beaver Creek (**BETSY CREEK**) drainages. Governors Creek and First Creek enter into Lake Secession; all of Lake Secession is included in the watershed.

The watershed occupies 128,810 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages

0.26; the slope of the terrain averages 8.8%, with a range of 2-15%. Land use/land cover in the watershed includes: 41% forested land, 28% agricultural land, 22% scrub/shrub land, 6% urban land, 2% water, and 1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|----------------------|------------------------|--------------|-------------------------------|
| SC0000400 | OWENS-CORNING | BETSY CREEK | IN | 0.15 |
| SC0000400 | OWENS-CORNING | BETSY CREEK | IN | 0.15 |
| SC0000400 | OWENS-CORNING | BETSY CREEK | IN | 0.15 |
| SC0000400 | OWENS-CORNING | BETSY CREEK | IN | 0.15 |
| SC0023744 | ANDERSON/ROCKY RIVER | ROCKY RV | MU | 6.1 |
| SC0037362 | DAVIDSON MINERAL | NESBIT CK- | IN | ----- |
| SC0044300 | PIONEER CONCRETE SC | PEA CREEK | IN | |
| SC0044300 | PIONEER CONCRETE SC | PEA CREEK | IN | |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-031 | P | FW | Rocky R. at S-04-263, 2.7 mi SE of Anderson at the sewage treatment plant |
| SV-041 | S | FW | Rocky River at S-04-152, below the Rocky River sewage treatment plant |
| SV-139 | S | FW | Cupboard Ck at S-04-733 |
| SV-140 | S | FW | Cupboard Creek at S-04-209 |
| SV-141 | S/BIO | FW | Broadway Creek at US 76, between Anderson and Belton |
| SV-319 | SS | FW | Broadway Lake, Broadway Creek arm upstream of public access |
| SV-258 | SS | FW | Broadway Lake, Neals Creek arm, 50% between banks at golf course |
| SV-321 | SS | FW | Broadway Lake forebay, 50% between spillway and opposite land |
| SV-346 | SS | FW | Rocky River at S-04-244 |
| SV-037 | S | FW | Betsy Creek at S-04-259, below Owens-Corning fiberglass outfall |
| SV-650 | BIO | FW | Rocky River at SC 413 |
| SV-043 | S | FW | Cherokee Creek at S-04-318, 4 miles S of Belton |
| SV-044 | BIO | FW | Hen Coop Creek at S-04-244 |

| Monitoring Locations | | | |
|---|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| SV-031 | P | FW | Rocky R. at S-04-263, 2.7 mi SE of Anderson at the sewage treatment plant |
| SV-331 | P | FW | Lake Secession, 1 1/4 miles below SC Route 28 |
| SV-332 | P | FW | Lake Secession, approximately 400 yards above dam |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are four monitoring sites on **ROCKY RIVER**. At the most upstream site (SV-031), aquatic life uses are not supported due to occurrences of copper and zinc in excess of the aquatic life acute standards, including a high concentration of zinc measured in 1995, compounded by a significant increasing trend in turbidity and a very high concentration of chromium measured in 1993. In sediment, di-n-butylphthalate was detected in 1996. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

Further downstream (SV-041), aquatic life uses are fully supported, but may be threatened by a significant increasing trend in turbidity. In sediment, di-n-butylphthalate was detected in 1996. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

At the next site downstream (SV-346), below Broadway Lake, aquatic life and recreational uses are fully supported. In sediment, di-n-butylphthalate was detected in 1996.

At the most downstream site (SV-650), aquatic life uses are only partially supported based on macroinvertebrate community data. Recreational use support was not assessed.

There are two monitoring sites on **CUPBOARD CREEK**. At the upstream site (SV-139), aquatic life uses are not supported due to dissolved oxygen and pH excursions, compounded by significant decreasing trends in dissolved oxygen and pH, and a significant increasing trend in turbidity. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

At the downstream site (SV-140), aquatic life uses are not supported due to dissolved oxygen excursions, compounded by a significant decreasing trend in pH and a significant increasing trend in turbidity.

This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

Aquatic life uses are only partially supported in **BROADWAY CREEK** (SV-141) based on macroinvertebrate community data, and may be further threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. A significant decreasing trend in total phosphorus concentration suggests improving conditions for this parameter. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

BROADWAY LAKE (SV-319, SV-321, SV-258) is a 300-acre impoundment on Broadway and Neals Creeks, with a maximum depth of approximately 22 feet (6.7 meters) and an average depth of approximately six feet (1.8 meters). The lake's watershed comprises 29 square miles (75.8 km²). SCDHEC is conducting a study of Broadway Lake to determine the longevity and effectiveness of dredging and watershed management practices implemented in the 1980's. The most recent eutrophication assessments indicate that Broadway Lake is one of the least eutrophic small lakes in South Carolina, characterized by very low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended. Aquatic life and recreational uses are fully supported at all three monitoring sites on Broadway Lake.

Aquatic life uses are not supported in **BETSY CREEK** (SV-037) due to occurrences of copper in excess of the aquatic life acute standards compounded by a very high concentration of chromium measured in 1992. 1,1-Dichloroethene is consistently measured above drinking water standards. 1,4-Dioxane, a potential carcinogen, is consistently detected, although there are no numeric standards. In sediment, diethyl phthalate and di-n-butylphthalate were measured in 1996, toluene and P,P' DDT were measured in 1995, PCB-1260 was measured in 1994, P-cresol was measured in 1993, and PCB-1248 was measured in all samples. Although the use of DDT was banned in 1973, and the manufacture and use of PCBs was banned in 1979, both are very resistant to degradation and therefore are very persistent in the environment. Recreational uses are fully supported, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

Aquatic life uses are fully supported in **CHEROKEE CREEK** (SV-043). A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

Aquatic life uses are fully supported in **HEN COOP CREEK** (SV-044) based on macroinvertebrate community data. Recreational use support was not assessed.

LAKE SECESSION is an 880-acre impoundment on the Rocky River, with a maximum depth of approximately 92 feet (28 meters) and an average depth of approximately 22 feet (6.7 meters). There are two monitoring sites on the lake.

At the uplake site (SV-331), aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. A significant decreasing trend

in five-day biochemical oxygen demand suggests improving conditions for this parameter. In sediment, a very high concentration of cadmium was measured in 1993, a very high concentration of zinc was measured in 1992, high concentrations of zinc were measured in 1993, 1994 and 1996. Also in sediment, bis(2-ethylhexyl)phthalate was measured in 1992 and 1993, di-n-butylphthalate was measured in 1996, P,P' DDT was measured in 1994 and 1995, P,P' DDD was measured in 1994 and 1996, O,P' DDD was measured in 1994, P,P' DDE was measured in 1994, 1995 and 1996, and butylbenzyl phthalate was measured in 1995. Although the use of DDT was banned in 1973, it is very persistent in the environment. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

At the down-lake site (SV-332), aquatic life uses are fully supported, but may be threatened by a significant increasing trend in total nitrogen concentrations, a very high concentration of copper measured in 1992, a very high concentration of lead measured in 1994, and the herbicide 2,4-D measured in 1995 and 1996. In sediment, a very high concentration of chromium was measured in 1994, high concentrations of chromium were measured in 1992, 1993, 1995 and 1996, high concentrations of copper were measured in 1994 and 1996, a very high concentration of lead was measured in 1996, very high concentrations of nickel were measured in 1993 and 1994, a high concentration of nickel was measured in 1996, a very high concentration of zinc was measured in 1994, and high concentrations of zinc were measured in 1993 and 1996. Also in sediment, di-n-butylphthalate was measured in 1996, O,P' DDT was measured in 1994, and P,P' DDE was measured in 1995 and 1996. Although the use of DDT was banned in 1973, it is very persistent in the environment. Recreational uses are fully supported at this site.

Eutrophication assessments indicate that Lake Secession is one of the most eutrophic large lakes in South Carolina, characterized by high densities of algae. An action plan for reducing nutrient inputs to the lake will be developed and implemented over the next several years.

The City of Abbeville operates a hydroelectric facility on Lake Secession.

A nonpoint source pollution education project has been implemented in this watershed by Clemson University through SCDHEC. The goal of the project is to educate watershed residents and water users in responsible practices to protect water quality and reduce nonpoint source inputs from urban activities. Professionals and volunteers are trained to work one-on-one with watershed residents, especially lakeshore residents, to assess nonpoint source problems around the house and show them how to prevent or reduce them. A "Home*A*Syst" information packet will be developed and distributed. Effectiveness of the program will be evaluated through surveys and on-site inspections. This is a three-year project ending in 1998.

03060103-080. Watershed 03060103-080 (map page 68) is located in Anderson and Abbeville Counties and consists primarily of **WILSON CREEK** and its tributaries. The Wilson Creek watershed incorporates Jordans Creek, East Beards Creek and Long Branch before joining the Rocky River downstream of Lake Secession. The watershed contains a total of 13.9 stream miles.

The watershed occupies 28,792 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 9.5%, with a range of 2-15%. Land use/land cover in the watershed

includes: 42% forested land, 32% scrub/shrub land, 24% agricultural land, <1% urban land, <1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-----------------|------------------------|--------------|-------------------------------|
| SC0025810 | IVA | E BEARD CK | MU | 0.245 |
| SC0037443 | MAYFAIR MILLS | WILSON CK | IN | 0.0128 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|----------------------------|
| Station Number | Type* | Class[†] | Station Description |
| SV-185 | BIO | FW | Wilson Creek at SC 413 |
| SV-347 | SS | FW | Wilson Creek at S-04-294 |
| <p>* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate</p> <p>[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters</p> | | | |

There are two monitoring sites on **WILSON CREEK**. At the upstream site (SV-185), aquatic life uses are only partially supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (SV-347), aquatic life uses are fully supported, but may be threatened due to a very high concentration of chromium measured in 1996. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03060103-100. Watershed 03060103-100 (map page 71) is located in Abbeville and McCormick Counties and consists primarily of **J. STROM THURMOND RESERVOIR** and the tributaries forming the lake. This watershed contains a segment of the Savannah River, which flows into and through Thurmond (Clarks Hill) Reservoir to the dam. There are a total of 61.05 stream miles in this watershed. The Richard B. Russell Lake watershed (03060103-030) flows into the headwaters of Thurmond Reservoir, and the Little River (03060103-140) and Long Cane Creek (03060103-150) watersheds flow into the Little River embayment midlake.

The watershed occupies 101,298 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cataula-Wilkes-Goldston-Cecil series. The erodibility of the soil (K-factor) averages 0.30; the slope of the terrain averages 10.7%, with a range of 2-45%. Land use/land cover in the watershed includes: 61% forested land, 17% water, 13% scrub/shrub land, 6% agricultural land, 2% barren land, and 1% urban land. Hickory Knob State Park is near the headwaters of Lake Thurmond, Baker

Creek State Park is on the Long Cane Creek embayment, and Hamilton Branch State Park is near the dam. The Sumter National Forest encompasses the majority of the watershed and all of the State Parks.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-----------------|------------------------|--------------|-------------------------------|
| SC0021466 | SC DEPT PRT | CLARK HILL | CO | 0.009 |
| SC0043401 | BARITE HILL | HAWK CREEK | IN | ----- |
| SC0043401 | BARITE HILL | HAWK CREEK | IN | MR |
| SC0043401 | BARITE HILL | HAWK CREEK | IN | MR |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| CL-040 | SS | FW | Thurmond Reservoir headwaters |
| SV-291 | P | FW | Thurmond Reservoir at US 378, 7 miles SW of McCormick |
| CL-039 | SS | FW | Thurmond Reservoir, Little River embayment |
| CL-041 | SS | FW | Thurmond Reservoir forebay |
| SV-294 | P | FW | Thurmond Reservoir at dam at US 221, SW of Clarks Hill |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

J. STROM THURMOND RESERVOIR is a 70,000-acre impoundment on the Savannah River, with a maximum depth of approximately 141 feet (43 meters) and an average depth of approximately 37 feet (11 meters). The lake's watershed comprises 6150 square miles (15,900 km²) in Georgia and South Carolina. There are five monitoring sites on Thurmond Reservoir.

At the mid-lake site (SV-291), aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH, a significant increasing trend in turbidity, and a high concentration of zinc measured in 1995. In sediment, a very high concentration of chromium was measured in 1992, a very high concentration of lead was measured in 1993, and di-n-butylphthalate was measured in 1995. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

At the down-lake site (SV-294), aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. In sediment, P,P' DDT and

P,P' DDE were detected in the 1992 sample. Although the use of DDT was banned in 1973, it is very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Eutrophication assessments using data from all five monitoring sites indicate that Thurmond Reservoir is one of the least eutrophic large lakes in South Carolina, characterized by very low nutrient concentrations. Preservation of this lake's desirable trophic condition is recommended.

The U.S. Army Corps of Engineers operates a hydroelectric facility on Thurmond Reservoir.

03060103-140. Watershed 03060103-140 (map page 74) is located in Anderson, Abbeville and McCormick Counties and consists primarily of the **LITTLE RIVER** and its tributaries. There are a total of 179.83 stream miles contained in this watershed. The Little River originates near the Town of Honea Path. Barkers Creek and Corners Creek join to form Little River and are joined downstream with the drainage from Long Branch, Hogskin Creek and Little Hogskin Creek. The Little River then receives drainages from Johnson Creek, Park Creek, Penny Creek and Shanklin Creek. Below these drainages, McKenley Creek (incorporating Clear Creek, Gill Creek and Morrow Creek) enters the river, and further downriver, **SAWNEY CREEK** enters.

Calhoun Creek is a very large drainage entering the Little River. Calhoun Creek originates near the Town of Abbeville and is joined by Flagreed Creek, White Creek and Hilburn Creek before entering the Little River. Several other smaller creeks enter Little River at the base of the watershed. The Little River watershed merges with the Long Cane Creek watershed (03060103-150) to form an arm of Lake Thurmond.

The watershed occupies 216,162 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 9.3%, with a range of 2-15%. Land use/land cover in the watershed includes: 65% forested land, 20% agricultural land, 11% scrub/shrub land, 3% urban land, <1% barren land, and <1% water. The Sumter National Forest covers a portion of the lower end of the watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)[†] |
|-----------------|-------------------|------------------------|-------------------|--------------------------|
| SC0022403 | DUE WEST/TOWN OF | PARK CK | MU | 0.3 |
| SC0023477 | MILLIKEN & CO | CALHOUN CK | IN | MR |
| SC0025721 | CALHOUN FALLS | LITTLE RIVER | MU | 1 |
| SC0035149 | HUGGINS GARMET CO | HOGSKIN CK | IN | MR |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| SV-164 | SS/BIO | FW | Little River at S-01-24 |
| SV-733 | BIO | FW | Hogskin Creek at SC 184 |
| SV-348 | SS/BIO | FW | Little River at S-01-32 |
| SV-644 | BIO | FW | Gill Creek at S-01-32 |
| SV-052 | P | FW | Sawney Creek at county road, 1.5 miles SE of Calhoun Falls |
| SV-171 | BIO | FW | Calhoun Creek at S-01-40 |
| SV-192 | SS | FW | Little River at S-33-19 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **HOGSKIN CREEK** (SV-733) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **GILL CREEK** (SV-644) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **SAWNEY CREEK** (SV-052), but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

Aquatic life uses are fully supported in **CALHOUN CREEK** (SV-171) based on macroinvertebrate community data.

There are three monitoring sites on **LITTLE RIVER**. At the most upstream site (SV-164), aquatic life uses are fully supported based on macroinvertebrate community data, but may be threatened by a high concentration of zinc measured in 1996. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

At the next site downstream (SV-348), aquatic life uses are fully supported, but may be threatened by a high concentration of zinc measured in 1995. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

At the most downstream site (SV-192), aquatic life and recreational uses are fully supported.

03060103-150. Watershed 03060103-150 (map page 74) is located in Abbeville, Greenwood and McCormick Counties and consists primarily of **LONG CANE CREEK** and its tributaries. The Long Cane Creek watershed is a large drainage area that joins with the Little River watershed (03060103-140) to form an arm of Lake Thurmond. There are a total of 86.21 stream miles contained within this watershed. Many smaller creeks flow into Long Cane Creek including: Norris Creek, Miller Branch, Grays Creek, Bailey Creek, Dry Creek, Johns Creek, McCord Creek, **BLUE HILL CREEK** and Double Branch. A larger drainage entering Long Cane Creek is the Big Curltail Creek and Little Curltail Creek drainage; additional drainages include the Reedy Branch and South Fork Creek drainage and Linkay Creek. The Bold Branch (incorporating Persimman Branch, Rock Branch and Welch Creek) drainage enters Long Cane Creek at the headwaters of the lake.

The watershed occupies 137,544 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee series. The erodibility of the soil (K-factor) averages 0.26; the slope of the terrain averages 9.2%, with a range of 2-15%. Land use/land cover in the watershed includes: 73% forested land, 13% agricultural land, 11% scrub/shrub land, 2% urban land, <1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)[†] |
|-----------------|------------------------------|------------------------|-------------------|--------------------------|
| SC0000353 | MILLIKEN (proposed) | BLUE HILL CK | IN | MR |
| SC0000353 | MILLIKEN (proposed) | BLUE HILL CK | IN | MR |
| SC0000353 | MILLIKEN/ABBEVILLE | BLUE HILL CK | IN | MR |
| SC0000353 | MILLIKEN/ABBEVILLE | BLUE HILL CK | IN | MR |
| SC0000353 | MILLIKEN (proposed) | LONG CANE CK | IN | MR |
| SC0000353 | MILLIKEN/ABBEVILLE | LONG CANE CK | MU | MR |
| SC0023191 | GATEWOOD SD | BIG CURLYTAIL | CO | 0.08 |
| SC0040614 | CITY OF ABBEVILLE | LONG CANE CK | MU | 1.7 |
| SC0040614 | CITY OF ABBEVILLE (proposed) | LONG CANE CK | MU | 2.5 |
| SC0041017 | ABBEVILLE/WATER | BLUE HILL CK | IN | MR |
| SC0043567 | ABBEVILLE CITY BARN | NORRIS CREEK | IN | MR |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-349 | SS/BIO | FW | Long Cane Creek at S-01-159 |
| SV-734 | BIO | FW | Johns Creek at S-01-159 |
| SV-053B | S | FW | Blue Hill Creek on South Main Street, Abbeville |

| Monitoring Locations | | | |
|---|--------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| SV-349 | SS/BIO | FW | Long Cane Creek at S-01-159 |
| SV-054 | BIO | FW | Double Branch at S-01-33 |
| SV-732 | BIO | FW | Big Curly Tail Creek at US Forest Service Rd 509 |
| SV-318 | P/BIO | FW | Long Cane Creek at S-33-117, 7.0 miles NW of McCormick |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are only partially supported in **JOHNS CREEK** (SV-734) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **BLUE HILL CREEK** (SV-053B), but may be threatened by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen and a significant decreasing trend in five-day biochemical oxygen demand suggests improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Aquatic life uses are only partially supported in **DOUBLE BRANCH** (SV-054) based on macroinvertebrate community data.

Aquatic life uses are fully supported in **BIG CURLY TAIL CREEK** (SV-732) based on macroinvertebrate community data.

There are two monitoring sites on **LONG CANE CREEK**. At the upstream site (SV-349), aquatic life uses are fully supported based on macroinvertebrate community, physical and chemical data. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the downstream site (SV-318), aquatic life uses are fully supported based on macroinvertebrate community data, but may be threatened by a significant decreasing trend in pH, a significant increasing trend in turbidity, and a very high concentration of lead measured in 1993. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, however a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03060107-010. Watershed 03060107-010 (map page 78) is located in Greenwood and McCormick Counties and consists primarily of **STEVENS CREEK** and its tributaries. The Stevens Creek watershed contains a total of 128.44 stream miles. Stevens Creek is formed by the confluence of **HARD LABOR CREEK** (incorporating Armstrong Branch, Cowhead Creek and Little Cowhead Creek, Beaverdam Branch, Cuning Ford Creek, Calabash Branch and Big Branch), Rocky Creek and **CUFFYTOWN CREEK** (incorporating Horsepen Creek, Beaverdam Creek, Reedy Creek, Little Creek and Cow Branch). Byrd Branch enters Stevens Creek at the base of the watershed prior to the Stevens Creek and Turkey Creek confluence.

The watershed occupies 160,984 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Tatum-Herndon-Georgeville-Helena series. The erodibility of the soil (K-factor) averages 0.33; the slope of the terrain averages 7.4%, with a range of 2-25%. Land use/land cover in the watershed includes: 77% forested land, 11% scrub/shrub land, 9% agricultural land, 2% urban land, <1% barren land, and <1% water. The Sumter National Forest covers the central portion of the watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|--------------------|------------------------|--------------|-------------------------------|
| SC0000396 | MILLIKEN & CO | PERSIMMON TR | IN | |
| SC0000396 | MILLIKEN & CO | PERSIMMON TR | IN | |
| SC0022870 | GREENWOOD | HARD LABOR | MU | 2.2 |
| SC0026891 | AUGUSTA FIELDS SD | COWHEAD CK | CO | 0.04 |
| SC0030783 | MCCORMICK/ROCKY CK | ROCKY CK | MU | 0.85 |
| SC0044580 | MCCORMICK COUNTY | STEVENS CK | MU | 3.25 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|-------------------------------------|
| Station Number | Type* | Class[†] | Station Description |
| SV-151 | P/BIO | FW | Hard Labor Creek at S-24-164 bridge |
| SV-731 | BIO | FW | Hard Labor Creek at S-33-23 |
| SV-351 | SS/BIO | FW | Cuffytown Creek at S-33-138 |
| SV-730 | BIO | FW | Rocky Creek at S-33-87 |
| SV-330 | P | FW | Stevens Creek at S-33-21 |

| Monitoring Locations | | | |
|---|-------|--------------------|-------------------------------------|
| Station Number | Type* | Class [†] | Station Description |
| SV-151 | P/BIO | FW | Hard Labor Creek at S-24-164 bridge |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **HARD LABOR CREEK**. At the upstream site (SV-151), aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards and impacts to the macroinvertebrate community, compounded by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand, total phosphorus concentration and turbidity suggests improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, however a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the downstream site (SV-731), aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **CUFFYTOWN CREEK** (SV-351) based on macroinvertebrate, physical and chemical data. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

Aquatic life uses are only partially supported in **ROCKY CREEK** (SV-730) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **STEVENS CREEK** (SV-330) but may be threatened by a significant decreasing trend in pH. A significant decreasing trend in five-day biochemical oxygen demand suggests improving conditions for this parameter. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03060107-020. Watershed 03060107-020 (map page 81) is located in Saluda, Greenwood, McCormick and Edgefield Counties and consists primarily of **TURKEY CREEK** and its tributaries. The Turkey Creek watershed contains a total of 110.15 stream miles. The watershed contains: Little Turkey Creek, Little Stevens Creek, Sleep Creek, Mountain Creek, Little Mountain Creek, Rocky Creek and Cyper Creek; the entire drainage flows into Stevens Creek. The Beaver Creek watershed (03060107-030) flows into this watershed.

The watershed occupies 149,262 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Herndon-Tatum-Georgeville series. The erodibility of the soil (K-factor) averages 0.35; the slope of the terrain averages 7.2%, with a range of 2-25%. Land use/land cover in the watershed includes: 75% forested land, 13% scrub/shrub land, 11% agricultural land, <1% urban land, <1% barren land, <1% forested wetland, and <1% water. The Sumter National Forest covers a portion of the watershed.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------|----------------------------------|
| Station Number | Type* | Class† | Station Description |
| SV-729 | BIO | FW | Turkey Creek at S-19-100 |
| SV-728 | BIO | FW | Log Creek at S-19-315 |
| SV-727 | BIO | FW | Rocky Creek at S-19-61 |
| SV-352 | SS | FW | Turkey Creek at S-33-227/S-19-68 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **LOG CREEK** (SV-728) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **ROCKY CREEK** (SV-727) based on macroinvertebrate community data. Recreational use support was not assessed.

There are two monitoring sites on **TURKEY CREEK**. At the upstream site (SV-729), aquatic life uses are fully supported based on macroinvertebrate community data. At the downstream site (SV-352), aquatic life and recreational uses are fully supported.

03060107-030. Watershed 03060107-030 (map page 81) is located in Edgefield County and consists primarily of **BEAVERDAM CREEK** and its tributaries. The Beaverdam Creek watershed contains a total of 19.10 stream miles. Beaverdam Creek flows through the town of Edgefield and enters the Turkey Creek watershed (03060107-020), which flows into Stevens Creek (03060106-040).

The watershed occupies 27,569 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Tatum-Herndon-Georgeville series. The erodibility of the soil (K-factor) averages 0.31; the slope of the terrain averages 7.0%, with a range of 2-25%. Land use/land cover in the watershed includes: 63% forested land, 17% scrub/shrub land, 13% agricultural land, 5% urban land, 1% water, <1% barren land, and <1% forested wetland. The Sumter National Forest covers the area where Beaverdam Creek flows into Turkey Creek.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)† |
|---|-------------------|-----------------|------------|--------|
| SC0025330 | ECW&SA/BROOKS AVE | BEAVERDAM | MU | 0.725 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| †MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|--|--------|--------|--|
| Station Number | Type* | Class† | Station Description |
| SV-068 | S | FW | Beaverdam Creek at S-19-35, 3.8 miles NW of Edgefield |
| SV-353 | SS/BIO | FW | Beaverdam Creek at Forest Service Road 621 off S-19-68 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **BEAVERDAM CREEK**. At the upstream site (SV-068), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentration suggests improving conditions for these parameters. Recreational uses are fully supported at this site.

At the downstream site (SV-353), aquatic life uses are fully supported based on macroinvertebrate, physical and chemical data. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03060107-040. Watershed 03060107-040 (map page 81) is located in Edgefield and McCormick Counties and consists primarily of **STEVENS CREEK** and its tributaries. This watershed contains a segment of Stevens Creek that flows from below the Turkey Creek confluence to the Stevens Creek dam at the Savannah River. There are a total of 97 stream miles in this watershed. Smaller drainages that join into this segment of Stevens Creek include: Cuffy Branch, Gundy Creek, Lloyd Creek, Horn Creek (Double Branch and Cedar Creek), Dry Branch, Cheves Creek and Sweetwater Branch

The watershed occupies 144,020 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Cecil-Hiwassee-Lakeland series. The erodibility of the soil (K-factor) averages 0.24; the slope of the terrain averages 8.7%, with a range of 0-25%. Land use/land cover in the watershed includes: 69% forested land, 21% scrub/shrub land, 7% agricultural land, 1% urban land, 1% water, <1% barren land, and <1% forested. The Sumter National Forest extends over roughly half of the watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)† |
|-----------|----------------------|-----------------|------------|--------|
| SC0032492 | ECW&SA/LAND-O-LAKES | CHEVES CRK | MU | 0.015 |
| SC0034673 | BP OIL INC/N AUGUSTA | SWEETWATER | IN | MR |
| SC0038628 | CONOCO INC/N AUG TER | SWEETWATER | IN | MR |
| SC0038873 | AMOCO OIL/N AUG | SWEETWATER | IN | MR |

*IN=industrial, CO=community, MU=municipal

†MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|-------|--------|-----------------------------------|
| Station Number | Type* | Class† | Station Description |
| SV-063 | BIO | FW | Stevens Creek at SC 23 |
| SV-354 | SS | FW | Stevens Creek at S-33-88/S-19-143 |
| SV-726 | BIO | FW | Horn Creek at S-19-143 |
| SV-725 | BIO | FW | Cheves Creek at S-19-34 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **STEVENS CREEK** in this watershed unit. At the upstream site (SV-063) aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed. At the downstream site (SV-354), aquatic life and recreational uses are fully supported.

Aquatic life uses are fully supported in **HORN CREEK** (SV-726) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **CHEVES CREEK** (SV-725) based on macroinvertebrate community data. Recreational use support was not assessed.

A nonpoint source pollution reduction project has been implemented in this watershed by SC Department of Natural Resources through SCDHEC. The goal of the project is to reduce sediment, nutrients, and chemical runoff from cropland, pasture, hayland, unconfined livestock, logging activities, and unpaved roads. Implementation activities include education, demonstration, training, and technical assistance on sustainable agriculture practices, forestry BMPs, and unpaved, dirt road maintenance. SCDHEC is conducting water quality monitoring. This project commenced in May 1995 and is ongoing, with scheduled completion in May 1998.

Management Unit WMU-0103

Management Unit WMU-0103 extends along the western edge of South Carolina from Aiken County through Jasper County. It contains portions of Barnwell, Allendale, and Hampton Counties as well.

Population. The 1990 populations and projections for the year 2010 for counties within WMU-0103 are listed in the table below. Jasper County is expected to experience the greatest population change during this time period, with an increase of 46%.

| <i>County</i> | <i>1990 Population</i> | <i>2010 Population</i> | <i>Change (%)</i> |
|----------------------|-------------------------------|-------------------------------|--------------------------|
| Aiken | 120,940 | 149,000 | 23 |

| County | 1990 Population | 2010 Population | Change (%) |
|---------------|------------------------|------------------------|-------------------|
| Allendale | 11,722 | 13,100 | 12 |
| Barnwell | 20,293 | 26,200 | 29 |
| Hampton | 18,191 | 20,700 | 14 |
| Jasper | 15,487 | 22,600 | 46 |

Climate. Normal annual rainfall in the WMU-0103 area was 47.82 inches, according to the S.C. historic climatological record. The data were collected from National Weather Service stations in Aiken, Blackville and Hampton. The highest seasonal rainfall of 14.8 inches was in the summer related to the higher occurrence of thunderstorms in the area. The lowest rainfall occurred during the fall with 8.6 inches. Winter and spring rainfalls were 11.6 and 12.8 inches, respectively. The mean annual temperature for the watershed management unit was 64.2°F. Summer temperatures averaged 79.2°F; fall, winter and spring temperatures averaged 65.1, 48.3 and 64.3°F, respectively.

Fish Consumption Advisories. A fish consumption advisory has been issued by SCDHEC for **VAUCLUSE POND** and **FLAT ROCK POND**, advising people to limit the amount of some types of fish consumed from these waters and their tributaries due to mercury contamination. Pregnant women, infants, children, and people with neurologic diseases face the greatest risk of mercury-related health problems and should not eat any fish from these waters. The fish consumption guidelines are based on diets of one type of fish only. If a person consumes several of the species listed for a river or pond, then the person should cut back even further on the amounts of each species consumed. For example, if a person eats two pounds of largemouth bass from the Flat Rock Pond, the person should not eat any catfish from that pond that month. The types of fish with elevated mercury and the maximum amounts of those fish that can be safely consumed are as follows:

| | | |
|----------------|-----------------|----------------|
| Vaucluse Pond | Largemouth Bass | 1.5 lb./month |
| Flat Rock Pond | Largemouth bass | 2.0 lb./month |
| | Channel Catfish | 1.75 lb./month |

The source of mercury contamination in fish tested by SCDHEC is uncertain. Mercury occurs naturally, which may be partially responsible for the levels found in fish tissue. Another source is deposition from the air, a result of the combustion of fossil fuels. There are no data available linking mercury in wastewater discharges as a major source of mercury in fish. Naturally occurring low pH, low hardness, low alkalinity and low dissolved oxygen levels commonly found in coastal plains swamps and blackwater streams are conditions that promote the transformation of inorganic mercury into methylmercury, the form most readily accumulated by fish.

South Carolina is not the only state where mercury is showing up in fish. About 40 other states are also seeing high mercury levels and have issued advisories. States are working together and with the U.S. Environmental Protection Agency to try to identify the cause or causes of mercury in fish.

Since the late 1800's, untreated or partially treated textile wastewater was discharged to Horse Creek and **LANGLEY POND** resulting in sediment contaminated with chromium, mercury and PCBs. In 1979, a new regional wastewater treatment facility that discharged to the Savannah River was constructed providing proper

wastewater treatment to Horse Creek dischargers. Since the treatment facility began operation, water quality in Langley Pond has improved; however, sediments in the pond remain contaminated and fish accumulate these contaminants. The manufacture and use of PCBs was banned in 1979, but PCBs are very resistant to degradation and therefore are very persistent in the environment.

The Department has issued a fish consumption advisory, warning people not to consume fish from Langley Pond because of the presence of elevated concentrations of mercury and PCBs.

A fish consumption advisory has been issued by SCDHEC for the **SAVANNAH RIVER** advising people to limit the amount of fish consumed from these waters and their tributaries due to contamination by mercury and the radioactive isotopes Cesium-137 and Strontium-90. In 1995, analysis of fish tissue by the SCDHEC revealed mercury contamination in certain types of fish from specific areas of the Savannah River. As a result of these findings, a fish consumption advisory was issued to reduce human exposure. In 1996 the original advisory was expanded to include all species of fish in certain areas based on levels of the two radioisotopes.

The radioisotope releases occurred due to historic methods for the disposal of radioactive materials at the Savannah River Site (SRS). As with mercury, fish also concentrate the radioisotopes to levels of concern.

The types of fish with restrictions and the maximum amounts of those fish that can be safely consumed are as follows:

| | | |
|---|--|----------------|
| Thurmond Reservoir to Beech Island | | |
| Largemouth Bass | | 4.75 lb./month |
| all other fish | | no limit |
| Beech Is. to Allendale/Barnwell county line | | |
| Largemouth bass | | 1.75 lb./month |
| all other fish | | 1.5 lb./month |
| Allendale/Barnwell county line to Web Wildlife Center | | |
| Largemouth Bass | | 2.5 lb./month |
| all other fish | | 4.0 lb./month |
| Webb Wildlife Center to I-95 | | |
| Largemouth Bass | | 1.0 lb./month |
| all other fish | | no limit |

Pregnant women, infants, children, and people with neurologic diseases face the greatest risk of mercury related health problems and should not eat any fish from these waters.

Capacity Use Area. As part of the Capacity Use Program, the Department monitors a number of wells to determine the relationship between water levels and pumpage in order to determine regional impacts and evaluate reserve supply. The Department has undertaken a project in conjunction with the State of Georgia to determine the extent of salt water intrusion in Southern Beaufort and Jasper Counties. Beaufort, Colleton, and Jasper Counties make up the Low Country Capacity Use Area.

03060106-030. Watershed 03060106-030 (map page 87) is located in Edgefield and Aiken Counties and consists primarily of the **SAVANNAH RIVER** and its tributaries. This watershed includes the segment of the Savannah River that flows from the Lake Thurmond dam through the Stevens Creek dam to the confluence with the Horse Creek watershed. There are a total of 32.02 stream miles in this watershed. The watershed also includes Fox Creek and Pole Branch, which flow into the river below the Stevens Creek dam. As a reach of

the Savannah River, this watershed accepts all upstream drainage, including the Stevens Creek watershed (03060107-040).

The watershed occupies 33,235 acres of the Piedmont region of South Carolina. The predominant soil types consist of an association of the Fuquay-Troup-Cataula-Cecil series. The erodibility of the soil (K-factor) averages 0.20; the slope of the terrain averages 7.4%, with a range of 0-15%. Land use/land cover in the watershed includes: 46% forested land, 26% urban land, 15% scrub/shrub land, 6% water, 5% agricultural land, 2% forested wetland, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|---|-----------------|------------------------|--------------|-------------------------------|
| SC0034347 | ECW&SA | SAVANNAH | IN | 0.06 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| [†] MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|---|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-251 | P | FW | Savannah River at US 1, 1.5 miles SW of North Augusta |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury, Cesium-137 and Strontium-90 and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0103).

Aquatic life uses are fully supported in **SAVANNAH RIVER** (SV-251), but may be threatened by a significant decreasing trend in pH and a high concentration of zinc measured in 1993. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

South Carolina Electric and Gas Company operates a hydroelectric facility on Stevens Creek Reservoir.

03060106-050. Watershed 03060106-050 (map page 89) is located in Edgefield and Aiken Counties and consists primarily of **HORSE CREEK** and its tributaries. The Horse Creek watershed runs alongside the City of Aiken and flows into the Savannah River. There are a total of 64.81 stream miles in this watershed. There are also several ponds and small lakes that are fed by Horse Creek and Little Horse Creek. Some of the smaller creeks and ponds that drain into Horse Creek include: Little Horse Creek (a small tributary, not the

major branch), Mathis Pond, Long Branch, Camp Branch, Spring Branch, **VAUCLUSE POND**, **FLAT ROCK POND**, Bridge Creek, Bridge Creek Pond, Wilkinson Creek, and **LANGLEY POND**. The **SAND RIVER** merges with Horse Creek before flowing into Langley Pond.

LITTLE HORSE CREEK flows into Horse Creek and accepts drainage from Eagleston Lake, Antique Lake, Hightower Creek, Franklin Branch, Sudlow Lake, Mathis Lake and Clearwater Pond.

The watershed occupies 100,993 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Lakeland-Fuquay-Troup series. The erodibility of the soil (K-factor) averages 0.12; the slope of the terrain averages 5.2%, with a range of 2-25%. Land use/land cover in the watershed includes: 58% forested land, 20% urban land, 9% agricultural land, 8% scrub/shrub land, 3% forested wetland, 2% water, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-----------------------|------------------------|--------------|-------------------------------|
| SC0000043 | GRANITEVILLE CO | HORSE CREEK | IN | 0.83 |
| SC0022675 | J M HUBER CORP | HORSE CREEK | IN | 0.015 |
| SC0027529 | AUGUSTA SAND & GRAVEL | HORSE CREEK | IN | MR |
| SC0032638 | GREEN ACRES MHP | HORSE CREEK | MU | 0.017 |
| SC0039519 | CHARTER TERMINAL | FRANKLIN BR | IN | MR |
| SC0039730 | AIR PRODUCTS | HORSE CREEK | IN | 3 |
| SC0040096 | J M HUBER CORP | HORSE CREEK | IN | 0.04 |
| SC0042307 | MARTIN MARIETTA | LITTLE HORSE | IN | 1.4 |
| SC0042307 | MARTIN MARIETTA | LITTLE HORSE | IN | 1.4 |
| SC0045756 | ALLSTATE #225 | HORSE CREEK | IN | 0.03456 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| CL-067 | SS | FW | Vaucluse Pond in forebay near dam |
| SV-686 | SS | FW | Flat Rock Pond in forebay near dam |
| SV-722 | SS | FW | Bridge Creek Pond forebay |
| SV-329 | P | FW | Horse Creek at Ascauga Lake Rd (S-02-33) in Graniteville |
| SV-071 | P | FW | Horse Creek at S-02-104, 0.6 miles SW of Graniteville |
| SV-069 | P/BIO | FW | Sand River at old US 1, 1.2 miles SE of Warrenville |

| Monitoring Locations | | | |
|--|-------|--------|---|
| Station Number | Type* | Class† | Station Description |
| CL-067 | SS | FW | Vaocluse Pond in forebay near dam |
| CL-069 | SS | FW | Langley Pond in forebay near dam |
| SV-096 | P | FW | Horse Creek below Langley Pond at S-02-254 |
| SV-724 | BIO | FW | Little Horse Creek at S-02-104 |
| SV-073 | S | FW | Little Horse Creek at SC 421 |
| SV-072 | S | FW | Horse Creek at S-02-145 |
| SV-250 | P | FW | Horse Creek at SC 125, 1.5 miles SW of Clearwater |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

VAUCLUSE POND (CL-067) is a 125-acre impoundment on Horse Creek, with a maximum depth of approximately 15 feet (4.6 meters) and an average depth of approximately seven feet (2.1 meters). The pond's watershed comprises 88 square miles (228 km²). Eutrophication assessments indicate that Vaocluse Pond is one of the least eutrophic small lakes in South Carolina, characterized by the low nutrient concentrations, low pH, and dark color typical of Sandhills impoundments. Preservation of this lake's desirable trophic condition is recommended. A fish consumption advisory has been issued by the Department for Vaocluse Pond due to mercury contamination (see Fish Consumption Advisory, Management Unit WMU-0103).

FLAT ROCK POND (SV-686) is an 80-acre impoundment on Horse Creek, with a maximum depth of approximately 13 feet (4.0 meters) and an average depth of approximately seven feet (2.1 meters). Eutrophication assessments indicate that Flat Rock Pond is one of the least eutrophic small lakes in South Carolina, characterized by the low nutrient concentrations, low pH, and dark color typical of Sandhills impoundments. Preservation of this lake's desirable trophic condition is recommended. A fish consumption advisory has been issued by the Department for Flat Rock Pond due to mercury contamination (see Fish Consumption Advisory, Management Unit WMU-0103).

BRIDGE CREEK POND (SV-722) is a 60-acre impoundment on Bridge Creek, with a maximum depth of approximately 16 feet (5.0 meters) and an average depth of approximately five feet (1.5 meters). Eutrophication assessments indicate that Bridge Creek Pond is one of the least eutrophic small lakes in South Carolina, characterized by low phosphorus concentrations, dense aquatic plant growth, and dark, very clear water. Preservation of this lake's desirable trophic condition is recommended.

There are five monitoring sites on **HORSE CREEK**. At the most upstream site (SV-329), aquatic life uses are only partially supported due to occurrences of copper in excess of the aquatic life acute standards, compounded by a significant increasing trend in turbidity. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

At the next site downstream (SV-071), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH and a high concentration of zinc measured in 1996. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Downstream of Langley Pond (SV-096), aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards, compounded by a significant decreasing trend in pH and significant increasing trends in total nitrogen concentration and turbidity. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, P,P' DDT was measured in 1994 and 1995, and P,P' DDD, a metabolite of DDT, was also detected in 1994. Although the use of DDT was banned in 1973, it is very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentration suggests improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Further downstream (SV-072), below the confluence with Little Horse Creek, aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, a very high concentration of cadmium was measured in 1994, a high concentration of chromium in 1993, very high concentrations of chromium were measured in 1995 and 1996, and a very high concentration of mercury in 1996. Also in sediment, P,P' DDE, a metabolite of DDT, was detected in 1996 and PCB 1254 was detected in 1993. Although the use of DDT was banned in 1973, and the manufacture and use of PCBs was banned in 1979, both are very resistant to degradation and therefore are very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentration suggests improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the most downstream site (SV-250), aquatic life use are fully supported, but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, very high concentrations of chromium were measured in 1993, 1994 and 1995, a high concentration of chromium in 1996, a high concentration of copper was measured in 1993, and very high concentrations of mercury were measured in 1993 and 1996. Also in sediment, O,P' DDD and P,P' DDE, metabolites of DDT, were measured in 1993, PCB 1254 was measured in 1994, and chlordane was measured in 1996. Although the use of DDT was

banned in 1973, and the manufacture and use of PCBs was banned in 1979, both are very resistant to degradation and therefore are very persistent in the environment. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentration suggests improving conditions for these parameters. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **SAND RIVER** (SV-069) based on macroinvertebrate community data, but may be threatened due to occurrences of chromium, copper, and zinc in excess of the aquatic life acute standards, compounded by very high concentrations of chromium measured in 1992 and 1996, a very high concentration of lead measured in 1996, a very high concentration of zinc measured in 1995, a high concentration of zinc measured in 1994 and a significant increasing trend in turbidity. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

LANGLEY POND (CL-069) is a 250-acre impoundment on Horse Creek, with a maximum depth of approximately 19 feet (5.8 meters) and an average depth of approximately 4.9 feet (1.5 meters). Eutrophication assessments indicate that Langley Pond is of intermediate trophic condition among small lakes in South Carolina, and is characterized by low nitrogen concentrations, and the low pH and dark color typical of Sandhills impoundments. A fish consumption advisory has been issued by the Department for Langley Pond due to mercury and PCB contamination (see Fish Consumption Advisory, Management Unit WMU-0103).

There are two monitoring sites on **LITTLE HORSE CREEK**. At the upstream site (SV-724) aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (SV-073), aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. In sediment, a high concentration of copper was measured in 1994, a high concentration of lead was measured in 1995, and endosulfan was measured in 1996. A significant decreasing trend in total phosphorus concentration suggests improving conditions for this parameter. Recreational uses are fully supported at this site but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

03060106-060. Watershed 03060106-060 (map page 94) is located in Aiken County and consists primarily of the **SAVANNAH RIVER** and its tributaries. There are a total of 53.37 stream miles in this watershed. **HOLLOW CREEK** incorporates the drainage from smaller creeks and ponds from both Hollow Creek (Little Hollow Creek) and Town Creek (McElmurrays Pond and Boyd Pond). Above the Hollow Creek drainage, Little Pine Creek enters the river, connecting several oxbow lakes. Below the Hollow Creek drainage are more river oxbows. Island Creek enters the river near the base of the watershed. As a reach of the Savannah River, this watershed also accepts the drainage of all streams entering the river upstream of the watershed.

The watershed occupies 121,666 acres of the Upper Coastal Plain of South Carolina. Predominant soil types consist of an association of the Fuquay-Troup-Chewacla series. Erodibility of the soil (K-factor) averages 0.17; the slope of the terrain averages 4.2%, with a range of 0-25%. Land use/cover in the watershed

includes: 35% forested, 21% agricultural, 20% forested wetland, 14% scrub/shrub, 7% urban, 2% water, <1% barren, and <1% nonforested wetland.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD) [†] |
|-----------|-----------------------|-----------------|-------|-------------------------|
| SC0000574 | SC ELEC & GAS | SAVANNAH R. | IN | ----- |
| SC0000574 | SC ELEC & GAS | SAVANNAH R. | IN | ----- |
| SC0000574 | SC ELEC & GAS | SAVANNAH R. | IN | ----- |
| SC0000582 | KIMBERLY-CLARK CORP. | SAVANNAH R. | IN | 6.46 |
| SC0024457 | AIKEN PSA/HORSE CREEK | SAVANNAH R. | MU | 26 |
| SC0034894 | TODDS CAR WASH | SAVANNAH R. | IN | ---- |
| SC0040444 | SEABOARD SYSTEM RAIL | HOLLOW CK | IN | 0.0216 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| SV-252 | P | FW | Savannah River at SC 28, 1.6 miles NNW of Beech Island |
| SV-323 | P | FW | Savannah River at Lock and Dam |
| SV-350 | SS/BIO | FW | Hollow Creek at S-02-5 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury, Cesium-137 and Strontium-90 and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0103).

There are two monitoring sites on the **SAVANNAH RIVER** in this watershed unit. At the upstream site (SV-252), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand, total phosphorus, and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the downstream site (SV-323), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH. Endosulfan sulfate and 1,2-dichloropropane were detected in the water column in 1994. In sediment, di-n-butylphthalate was measured in 1995, very high concentrations of lead and zinc were measured in 1993, and a high concentration of mercury was measured in 1996. Significant

decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations, and total suspended solids suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Aquatic life uses are fully supported in **HOLLOW CREEK** (SV-350) based on macroinvertebrate community data. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

03060106-100. Watershed 03060106-100 (map page 96) is located in Aiken and Barnwell Counties and consists primarily of **UPPER THREE RUNS CREEK** and its tributaries. The Upper Three Runs Creek watershed, which drains into the Savannah River, contains a total of 58.4 stream miles. Tributaries of the Upper Three Runs Creek watershed include: Cedar Creek, Jackson Branch, Tinker Creek, Mill Creek and **TIMS BRANCH**.

The watershed occupies 140,783 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Fuquay-Troup-Ailey-Vaocluse series. The erodibility of the soil (K-factor) averages 0.13; the slope of the terrain averages 5.8%, with a range of 0-25%. Land use/land cover in the watershed includes: 64% forested land, 12% scrub/shrub land, 10% agricultural land, 9% forested wetland, 4% urban land, <1% barren land, <1% nonforested wetland, and <1% water. The lower half of the watershed is within the boundaries of the U.S. Department of Energy's Savannah River Site.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|------------------------|------------------------|--------------|-------------------------------|
| SC0000175 | USDOE WESTINGHOUSE SRS | CROUCH BR | IN | 0.07 |
| SC0000175 | USDOE WESTINGHOUSE SRS | CROUCH BR | IN | 0.17 |
| SC0000175 | USDOE WESTINGHOUSE SRS | MCQUEEN BR | IN | 0.037 |
| SC0000175 | USDOE WESTINGHOUSE SRS | MCQUEEN BR | IN | 0.05 |
| SC0000175 | USDOE WESTINGHOUSE SRS | TIMS BRANCH | IN | 0.0014 |
| SC0000175 | USDOE WESTINGHOUSE SRS | TIMS BRANCH | IN | 0.878 |
| SC0000175 | USDOE WESTINGHOUSE SRS | TIMS BRANCH | IN | 2.04 |
| SC0000175 | USDOE WESTINGHOUSE SRS | TIMS BRANCH | IN | 0.926 |
| SC0000175 | USDOE WESTINGHOUSE SRS | UPPER 3 RUNS | IN | 0.035 |
| SC0000175 | USDOE WESTINGHOUSE SRS | UPPER 3 RUNS | IN | 0.099 |
| SC0000175 | USDOE WESTINGHOUSE SRS | UPPER 3 RUNS | IN | 0.085 |
| SC0000175 | USDOE WESTINGHOUSE SRS | UPPER 3 RUNS | IN | 0.34 |
| SC0000175 | USDOE WESTINGHOUSE SRS | UPPER 3 RUNS | IN | 0.13 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|--|-------|--------|--------------------------------------|
| Station Number | Type* | Class† | Station Description |
| SV-680 | BIO | FW | Upper Three Runs Creek at S-02-113 |
| SV-723 | BIO | FW | Cedar Creek at S-02-79 |
| SV-324 | P | FW | Tims Branch at SRS Road C |
| SV-325 | P | FW | Upper Three Runs Creek at SRS Road A |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **CEDAR CREEK** (SV-723) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **TIMS BRANCH** (SV-324), but may be threatened by significant increasing trends in total phosphorus and total nitrogen concentrations, and turbidity, and a very high concentration of zinc measured in 1992. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

There are two monitoring sites on **UPPER THREE RUNS CREEK**. At the upstream site (SV-680) aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (SV-325), aquatic life uses are fully supported but may be threatened by a significant increasing trend in turbidity, a very high concentration of copper measured in 1995, and a high concentration of zinc measured in 1996. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03060106-110. Watershed 03060106-110 (map page 99) is located in Aiken, Barnwell and Allendale Counties, and consists of the Savannah River and its tributaries between Upper and Lower Three Runs Creek. The watershed draining into this segment of the Savannah River contains 80.41 stream miles. **FOURMILE CREEK** enters the Savannah River at the top of the watershed. Further downstream, the **STEEL CREEK** drainage, consisting of Pen Branch (Indian Grave Branch) and Meyers Branch, enters the river. As a reach

of the Savannah River, this watershed also accepts the drainage of all streams entering the river upstream of the watershed.

The watershed occupies 92,062 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Fuquay-Dothan-Troup series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 3.3%, with a range of 0-10%. Land use/land cover in the watershed includes: 57% forested land, 20% forested wetland, 8% scrub/shrub land, 7% agricultural land, 7% water, <1% nonforested wetland, <1% urban land, and <1% barren land. With the exception of a small drainage area that includes Boggy Gut Branch and Briar Branch, the entire watershed is within the boundaries of the U.S. Department of Energy's Savannah River Site.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)† |
|-----------------|------------------------|------------------------|--------------|--------------------|
| SC0000175 | USDOE WESTINGHOUSE SRS | BEAVER DAM | IN | 0.02 |
| SC0000175 | USDOE WESTINGHOUSE SRS | FOURMILE BR | IN | 1.05 |
| SC0000175 | USDOE WESTINGHOUSE SRS | FOURMILE BR | IN | 0.02 |
| SC0000175 | USDOE WESTINGHOUSE SRS | FOURMILE BR | IN | 1.15 |
| SC0000175 | USDOE WESTINGHOUSE SRS | FOURMILE BR | IN | 2 |
| SC0000175 | USDOE WESTINGHOUSE SRS | FOURMILE BR | IN | 1.076 |
| SC0000175 | USDOE WESTINGHOUSE SRS | INDIAN GRAVE | IN | 2.91 |
| SC0000175 | USDOE WESTINGHOUSE SRS | INDIAN GRAVE | IN | 0.337 |
| SC0000175 | USDOE WESTINGHOUSE SRS | INDIAN GRAVE | IN | M/R |
| SC0000175 | USDOE WESTINGHOUSE SRS | INDIAN GRAVE | IN | M/R |
| SC0000175 | USDOE WESTINGHOUSE SRS | INDIAN GRAVE | IN | 0.024 |
| SC0000175 | USDOE WESTINGHOUSE SRS | L-LAKE | IN | 41.7 |
| SC0000175 | USDOE WESTINGHOUSE SRS | L-LAKE | IN | 0.912 |
| SC0000175 | USDOE WESTINGHOUSE SRS | L-LAKE | IN | 0.035 |
| SC0000175 | USDOE WESTINGHOUSE SRS | PAR POND | IN | 3.86 |
| SC0000175 | USDOE WESTINGHOUSE SRS | PAR POND TRIB | IN | 0.0012 |
| SC0000175 | USDOE WESTINGHOUSE SRS | SAVANNAH R. | IN | 0.02 |
| SC0000175 | USDOE WESTINGHOUSE SRS | SAVANNAH R. | IN | 0.41 |
| SC0000175 | USDOE WESTINGHOUSE SRS | SAVANNAH R. | IN | 0.058 |
| SC0000175 | USDOE WESTINGHOUSE SRS | SAVANNAH R. | IN | 0.056 |
| SC0000175 | USDOE WESTINGHOUSE SRS | STEEL CREEK | IN | 3.86 |
| SC0000175 | USDOE WESTINGHOUSE SRS | STEEL CREEK | IN | 0.022 |
| SC0047431 | SC ELEC & GAS / SRS | BEAVER DAM | IN | 55.8 |
| SC0047431 | SC ELEC & GAS / SRS | SAVANNAH R. | IN | 0.13 |
| SC0047431 | SC ELEC & GAS / SRS | SAVANNAH R. | IN | 1.383 |

| Permit # | Facility | Receiving Water | Flow Type* (MGD)[†] |
|---|-----------------|----------------------------|---|
| *IN=industrial, CO=community, MU=municipal | | | |
| [†] MGD=million gallons per day, MR=monitor and report | | | |

| Monitoring Locations | | | |
|---|--------------|--------------------------|---------------------------------|
| Station Number | Type* | Class[†] | Station Description |
| SV-326 | P | FW | Four Mile Creek at SRS Road A-7 |
| SV-327 | P | FW | Steel Creek at SRS Road A |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **FOURMILE CREEK** (SV-326), but may be threatened by a significant increasing trend in turbidity and di-n-butylphthalate measured in 1994. Significant decreasing trends in five-day biochemical oxygen demand and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **STEEL CREEK** (SV-327), but may be threatened by a significant decreasing trend in pH and a very high concentration of zinc measured in 1992. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations, and turbidity suggests improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

03060106-130. Watershed 03060106-130 (map page 102) is located in Barnwell and Allendale Counties and consists primarily of **LOWER THREE RUNS CREEK** and its tributaries. The Lower Three Runs Creek watershed contains a total of 46.74 stream miles. The drainage includes Par Pond, near the Town of Barnwell, together with Mill Creek and Davis Branch.

The watershed occupies 112,619 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Blanton-Fuquay series. The erodibility of the soil (K-factor) averages 0.13; the slope of the terrain averages 3.1%, with a range of 0-10%. Land use/land cover in the watershed includes: 42% forested land, 30% scrub/shrub land, 13% forested wetland, 12% agricultural land, 3% water, <1% urban land, <1% barren land, and <1% nonforested wetland. Par Pond and the upper portion of Lower Three Runs Creek lie within the grounds of the U.S. Department of Energy's Savannah River Site.

| Monitoring Locations | | | |
|---|-------|--------|---|
| Station Number | Type* | Class† | Station Description |
| SV-328 | P | FW | Lower Three Runs Creek at S-06-20, 7.5 miles SW of Barnwell |
| SV-175 | S | FW | Lower Three Runs Creek at SC 125, 11 miles NW of Allendale |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **LOWER THREE RUNS CREEK**. At the upstream site (SV-328), aquatic life uses are only partially supported due to occurrences of copper in excess of the aquatic life acute standards, including a high concentration of copper measured in 1995, compounded by a significant decreasing trend in pH and a significant increasing trend in turbidity. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

At the downstream site (SV-175), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. A significant decreasing trend in five-day biochemical oxygen demand suggests improving conditions for this parameter. Recreational uses are fully supported, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

03060106-140. Watershed 03060106-140 (map page 102) is located in Allendale County and consists of the **SAVANNAH RIVER** and its tributaries below Lower Three Runs Creek to Gall Branch. This watershed contains a total of 47.5 stream miles. Brier Creek (consisting of Stoney Creek and Little Brier Creek) flows into the Savannah River at the top of the watershed; and, farther downriver, The Gaul enters. At the base of the watershed, Gall Branch drains into the river. As a reach of the Savannah River, this watershed also accepts the drainage of all streams entering the river upstream of the watershed.

The watershed occupies 60,892 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Blanton-Ogeechee-Chisolm series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 1.9%, with a range of 0-6%. Land use/land cover in the watershed includes: 78% forested land, 11% scrub/shrub land, 8% agricultural land, 2% water, <1% urban land, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)† |
|---|----------------------|-----------------|-------|-------------|
| SC0039918 | ALLENDAL/ TOWN OF | SAVANNAH RIV | MU | 1.7 |
| SC0042803 | SANDOZ CHEMICAL CORP | SAVANNAH RIV | IN | 3 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| †MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|---|-------|--------|--|
| Station Number | Type* | Class† | Station Description |
| SV-118 | P | FW | Savannah River at US 301, 12.5 miles SW of Allendale |
| SV-745 | BIO | FW | Brier Creek at S-03-102 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury, Cesium-137 and Strontium-90 and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0103).

Aquatic life uses are not supported in **SAVANNAH RIVER** (SV-118) due to occurrences of zinc in excess of the aquatic life acute standards, compounded by a significant decreasing trend in pH. Fluoranthene and P,P' DDE, a metabolite of DDT, were detected in the water column in 1994. In sediment, di-n-butylphthalate was measured in 1995. A significant increasing trend in dissolved oxygen and significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations, and total suspended solids suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Aquatic life uses are fully supported in **BRIER CREEK** (SV-745) based on macroinvertebrate community data. Recreational use support was not assessed.

03060109-020. Watershed 03060109-020 (map page 105) is located in Allendale, Hampton and Jasper Counties and consists of the **SAVANNAH RIVER** and its tributaries between Gall Branch and Cypress Branch. This watershed contains a total of 84.3 stream miles. Long Branch enters the river at the top of the watershed. The Boggy Swamp drainage, which incorporates Mill Bay Creek, enters the river further downstream. As a reach of the Savannah River, this watershed also accepts the drainage of all streams entering the river upstream of the watershed.

The watershed occupies 99,732 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Chastain-Rains-Arget-Norfolk-Tawcaw series. The erodibility of the soil (K-factor) averages 0.21; the slope of the terrain averages 1.3%, with a range of 0-6%. Land use/land cover in the watershed includes: 41% forested land, 30% forested wetland, 11% scrub/shrub land, 11% agricultural land, 5% nonforested wetland, 2% water, <1% urban land, and <1% barren land.

There are no permitted discharges in this watershed in South Carolina.

| Monitoring Locations | | | |
|---|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| SV-355 | SS | FW | Savannah River at Stokes Bluff Landing off S-25-461 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury, Cesium-137 and Strontium-90 and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0103). Aquatic life and recreational uses are fully supported in **SAVANNAH RIVER** (SV-355) at this site.

03060109-050. Watershed 03060109-050 (map page 105) is located in Hampton and Jasper Counties and consists of a segment of the Savannah River with **CYPRESS CREEK** draining into the top of the reach, and Lakes Coleman and Mayers draining into the base of the reach. There are a total of 18.5 stream miles in this watershed. Cypress Branch flows into Cypress Creek, which flows into the Savannah River. Further downstream, several unnamed creeks drain into Coleman Lake and Mayers Lake, which drain into the river.

The watershed occupies 79,239 acres of the Lower Coastal region of South Carolina. The predominant soil types consist of an association of the Santee-Argent-Rains-Lynchburg-Goldsboro series. The erodibility of the soil (K-factor) averages 0.20; the slope of the terrain averages 1.2%, with a range of 0-2%. Land use/land cover in the watershed includes: 42% forested land, 26% forested wetland, 18% agricultural land, 7% nonforested wetland, 5% scrub/shrub land, 2% urban land, <1% barren land, and <1% water.

There are no permitted discharges in this watershed in South Carolina.

| Monitoring Locations | | | |
|---|-------|--------------------|---------------------------|
| Station Number | Type* | Class [†] | Station Description |
| SV-744 | BIO | FW | Cypress Branch at US 321 |
| SV-356 | SS | FW | Cypress Creek at S-27-119 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **CYPRESS BRANCH** (SV-744) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are not supported in **CYPRESS CREEK** (SV-356) due to dissolved oxygen excursions. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

03060109-060. Watershed 03060109-060 (map page 107) is located in Jasper County and consists of the downstream-most segment of the **SAVANNAH RIVER**. This watershed contains a total of 18.0 stream miles, which includes the Savannah River Estuary, and empties into the Atlantic Ocean. Meyer Lake drains into the river at the top of the watershed. Downriver, Union Creek joins the Savannah at the upper edge of the Savannah River Wildlife Refuge. Within the refuge, Vermezobre Creek and Clydale Creek flow into the Back River, which reconnects with the Savannah River before draining into the ocean. Saltwater Creek connects the Savannah River to the Wright River (03050208-140) via the Back River; and downstream, the Mud River (Fields Cut) has a similar connection. As a reach of the Savannah River, this watershed also accepts the drainage of all streams entering the river upstream of the watershed.

The watershed occupies 39,298 acres of the Coastal Zone region of South Carolina. The predominant soil types consist of an association of the Bohicket-Argent series. The erodibility of the soil (K-factor) averages 0.13; the slope of the terrain averages 1.0%, with a range of 0-2%. Land use/land cover in the watershed includes: 40% nonforested wetland, 17% forested land, 14% agricultural land, 10% forested wetland, 8% urban land, 7% water, 3% scrub/shrub land, and 1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-----------------|------------------------|--------------|-------------------------------|
| SC0044385 | AMOCO SERVICE | SAVANNAH | IN | 0.023 |
| SC0034584 | HARDEEVILLE | SAVANNAH | MU | 1.01 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| SV-191 | P | SB* | Savannah River at US 17, 8.9 miles SSW of Hardeeville |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

A fish consumption advisory has been issued by the Department for mercury, Cesium-137 and Strontium-90 and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0103).

Aquatic life uses are fully supported in **SAVANNAH RIVER** (SV-191), but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. Although there were pH excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, endosulfan II and P,P' DDE, a metabolite of DDT, were detected in 1995. Although the use of DDT was banned in 1973, it is very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

The bacteria standard was changed in April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Management Unit WMU-0104

Management Unit WMU-0104 is located in the southern part of South Carolina and extends from Barnwell County to the Atlantic Ocean. It contains portions of Bamberg, Allendale, Colleton, Hampton, Jasper, and Beaufort Counties as well.

Population.. The 1990 populations and projections for the year 2010 for counties within WMU-0104 are listed in the following table. Beaufort County is expected to experience the greatest population change during this time period, with an increase of 111%. A decrease of 2% is expected in Bamberg County.

| <i>County</i> | <i>1990 Population</i> | <i>2010 Population</i> | <i>Change (%)</i> |
|----------------------|-------------------------------|-------------------------------|--------------------------|
| Allendale | 11,722 | 13,100 | 12 |
| Bamberg | 16,902 | 16,500 | -2 |
| Barnwell | 20,293 | 26,200 | 29 |
| Beaufort | 86,425 | 182,100 | 111 |
| Colleton | 34,377 | 44,400 | 29 |
| Hampton | 18,191 | 20,700 | 14 |
| Jasper | 15,487 | 22,600 | 46 |

Climate. Data from National Weather Service stations in Bamberg, Blackville, Hampton, Walterboro, Yemassee, Ridgeland and Beaufort were compiled to determine seasonal climatic information for the WMU-0104 area. Historical climatological records were compiled to provide the normal values. The normal annual rainfall was 49.52 inches. The highest seasonal rainfall occurred in the summer with 17.22 inches due to the higher occurrences of thunderstorms in the coastal plain. The average fall, winter and spring rainfall totals were 9.38, 10.67 and 12.25 inches, respectively. The mean annual daily temperature was 64.7°F, the warmest of the four drainage basins. Summer temperatures averaged 79.3°F; fall, winter and spring temperatures averaged 65.6, 49.1 and 64.8°F, respectively.

Fish Consumption Advisory. A fish consumption advisory has been issued by SCDHEC for the **COMBAHEE RIVER** and the **COOSAWHATCHIE RIVER** advising people to limit the amount of some types of fish consumed from these waters and their tributaries due to mercury contamination. Pregnant women, infants, children, and people with neurologic diseases face the greatest risk of mercury related health problems and should not eat any fish from these waters. The types of fish with elevated mercury and the maximum amounts of those fish that can be safely consumed are as follows:

| | | |
|---------------------|-----------------|----------------|
| Combahee River | Largemouth Bass | 0.75 lb./month |
| Coosawhatchie River | Bowfin | 1.5 lb./month |

The source of mercury contamination in fish tested by SCDHEC is uncertain. Mercury occurs naturally, which may be partially responsible for the levels found in fish tissue. Another source is deposition from the air, a result of the combustion of fossil fuels. There is no data available linking mercury in wastewater

discharges as a major source of mercury in fish. Mercury levels cannot be traced to any industries. Naturally occurring low pH, low hardness, low alkalinity and low dissolved oxygen levels commonly found in coastal plains swamps and blackwater streams are conditions that promote the transformation of inorganic mercury into methylmercury, the form most readily accumulated by fish.

South Carolina is not the only state where mercury is showing up in fish. About 40 other states are also seeing high mercury levels and have issued advisories. States are working together and with the U.S. Environmental Protection Agency to try to identify the cause or causes of mercury in fish.

Capacity Use Area. As part of the Capacity Use Program, the Department monitors a number of wells to determine the relationship between water levels and pumpage in order to determine regional impacts and evaluate reserve supply. The Department has undertaken a project in conjunction with the State of Georgia to determine the extent of salt water intrusion in Southern Beaufort and Jasper Counties. Beaufort, Colleton, and Jasper Counties make up the Low Country Capacity Use Area.

03050207-010. Watershed 03050207-010 (map page 111) is located in Barnwell County and consists of the upper **SALKEHATCHIE RIVER** and its tributaries above Turkey Creek. The upper Salkehatchie River originates with the confluence of Rosemary Creek (Gin Branch) and Buck Creek, and flows past the Town of Barnwell. There are a total of 25.1 stream miles in this watershed.

The watershed occupies 51,701 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Fuquay-Dothan-Varina-Blanton series. The erodibility of the soil (K-factor) averages 0.14; the slope of the terrain averages 4.0%, with a range of 0-10%. Land use/land cover in the watershed includes: 40% forested land, 23% scrub/shrub land, 20% agricultural land, 11% forested wetland, 5% urban land, <1% barren land, <1% nonforested wetland, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-578 | BIO | FW | Buck Creek at S-06-167 |
| CSTL-028 | P | FW | Salkehatchie River at SC 64, 2 miles W of Barnwell |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **BUCK CREEK** (CSTL-578) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are not supported in **SALKEHATCHIE RIVER** (CSTL-028) due to occurrences of copper in excess of the aquatic life acute standards, compounded by a significant increasing trend in turbidity and a very high concentration of zinc measured in 1996. In sediment, P,P' DDT was measured in 1992 and 1994, and P,P' DDE, a metabolite of DDT, was measured in 1992, 1993 and 1994. Although the use of DDT was banned in 1973, it is very persistent in the environment. Significant decreasing trends in five-day

biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

03050207-020. Watershed 03050207-020 (map page 111) is located in Barnwell County and consists of **TURKEY CREEK** and its tributaries. Turkey Creek is joined by Long Branch and flows around **LAKE EDGAR A. BROWN**, through the Town of Barnwell, and into the upper Salkehatchie River. The Turkey Creek watershed contains a total of 12.0 stream miles.

The watershed occupies 16,179 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Dothan-Fuquay-Varina series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 3.8%, with a range of 0-6%. Land use/land cover in the watershed includes: 35% scrub/shrub land, 19% agricultural land, 18% forested land, 14% forested wetland, 13% urban land, 1% water, <1% barren land, and <1% nonforested wetland. Barnwell State Park is located in this watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* (MGD)[†] |
|-----------------|------------------|------------------------|-------------------------------------|
| SC0003093 | MILLIKEN & CO | TURKEY CREEK IN | 1.3 |
| SC0025143 | BARNWELL/CITY OF | TURKEY CREEK MU | 1.5 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| CSTL-056 | BIO | FW | Turkey Creek at S-06-169 |
| CL-064 | SS | FW | Lake Edgar Brown in forebay near dam |
| CSTL-001B | S | FW | Turkey Creek, 1 mile below Milliken Barnwell outfall at Clinton St. |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

LAKE EDGAR A. BROWN (CL-064) is a 133-acre divided impoundment on Turkey Creek, with a maximum depth of approximately 10 feet (3.0 meters) and an average depth of approximately three feet (1.0 meters). An embankment isolates the lake proper from a smaller impoundment that conveys Turkey Creek flow. Excluding Turkey Creek drainage, Lake Brown's watershed comprises only 0.15 square miles (0.4 km²). Eutrophication assessments indicate that Lake Brown is the most eutrophic small lake in South Carolina, characterized by very high densities of algae and resultant poor water clarity. A diagnostic and feasibility study of Lake Brown was conducted by SCDHEC with assistance from the U.S. Environmental Protection Agency.

Rediversion of Turkey Creek through the lake was recommended, since the current poor flushing fosters high internal nutrient loading and recurrent nuisance algal blooms. Aquatic life uses are not supported in Lake Edgar Brown due to pH excursions, compounded by a significant increasing trend in pH. The South Carolina Department of Natural Resources manages the lake.

There are two monitoring sites on **TURKEY CREEK**. Upstream of Lake Edgar Brown (CSTL-056) aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed. Downstream of Lake Edgar Brown (CSTL-001B), aquatic life uses are fully supported but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. A significant increasing trend in dissolved oxygen and a significant decreasing trend in five-day biochemical oxygen demand suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03050207-030. Watershed 03050207-030 (map page 111) is located in Barnwell, Bamberg and Allendale Counties and consists primarily of the **SALKEHATCHIE RIVER** and its tributaries from Turkey Creek to just below Wells Branch. This segment of the Salkehatchie River includes the drainage of Toby Creek (Jordan Branch), Georges Juniper Creek, Birds Branch and Wells Branch. There are a total of 69.04 stream miles in this watershed. This watershed accepts drainage from the upper Salkehatchie watershed (03050207-010) and from the Turkey Creek watershed (03050207-020).

The watershed occupies 110,799 acres of the Sandhills region of South Carolina. The predominant soil types consist of an association of the Fuquay-Dothan-Troup-Blanton series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 3.6%, with a range of 1-10%. Land use/land cover in the watershed includes: 31% scrub/shrub land, 28% agricultural land, 24% forested land, 14% forested wetland, 1% barren land, 1% urban land, 1% nonforested wetland, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-003 | P | FW | Salkehatchie River at SC 278, 2.5 miles S of Barnwell |
| CSTL-577 | BIO | FW | Toby Creek at S-06-29 |
| CSTL-579 | BIO | FW | Birds Branch at S-05-567 |
| CSTL-048 | SS | FW | Salkehatchie River at U.S. 301 & 321 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **TOBY CREEK** (CSTL-577) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **BIRDS BRANCH** (CSTL-579) based on macroinvertebrate community data. Recreational use support was not assessed.

There are two monitoring sites on the **SALKEHATCHIE RIVER** in this watershed unit. At the upstream site (CSTL-003), aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards, compounded by a significant decreasing trend in pH and a significant increasing trend in turbidity. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions, however a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

At the downstream site (CSTL-048), aquatic life uses are fully supported. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

03050207-040. Watershed 03050207-040 (map page 115) is located in Bamberg, Allendale, Hampton and Colleton Counties and consists of the **SALKEHATCHIE RIVER** and its tributaries from just below Wells Branch to the Little Salkehatchie River. There are a total of 75.99 stream miles in this watershed. The streams draining into this reach of the Salkehatchie River include Kirkland Creek, Three Mile Branch, Tenanis Branch and Savannah Creek. This segment of the river also accepts drainage from the upper Salkehatchie River (03050207-030) and the Jackson Branch watershed (03050207-050).

The watershed occupies 105,330 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Torhunta-Lynchburg-Goldsboro series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 1.5%, with a range of 0-2%. Land use/land cover in the watershed includes: 36% forested wetland, 27% forested land, 22% agricultural land, 11% scrub/shrub land, 3% nonforested wetland, <1% urban land, <1% barren land, and <1% water. River's Bridge State Park is on the Salkehatchie River within this watershed.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|------------------|------------------------|--------------|-------------------------------|
| SC0004073 | MULTITEX CORP | GIN BRANCH | IN | 0.003 |
| SC0042099 | EHRHARDT/TOWN OF | SAVANNAH CK | MU | 0.08 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|-------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-053 | BIO | FW | Savannah Creek at S-05-87 |
| CSTL-006 | P | FW | Salkehatchie River at 601, 9 miles NE of Hampton |
| CSTL-104 | SS | FW | Salkehatchie River at SC 63 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **SAVANNAH CREEK** (CSTL-053) based on macroinvertebrate community data. Recreational use support was not assessed.

There are two monitoring sites on the **SALKEHATCHIE RIVER** in this watershed unit. At the upstream site (CSTL-006), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. In sediment, P,P' DDE, a metabolite of DDT, was measured in 1994 and 1995. Although the use of DDT was banned in 1973, it is very persistent in the environment. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions compounded by a significant increasing trend in fecal coliform bacteria concentrations.

At the downstream site (CSTL-104), aquatic life uses are fully supported. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03050207-050. Watershed 03050207-050 (map page 115) is located in Allendale and Hampton Counties and consists primarily of Jackson Branch and its tributaries. The Jackson Branch watershed contains a total of 50.4 miles, and drains into the Salkehatchie River. Jackson Branch incorporates the drainages of Log Branch (near the Town of Allendale), Miller Creek, Caw Swamp (near the Town of Fairfax), and Cope Creek, all of which flow through **WHIPPY SWAMP** en route to the Salkehatchie River.

The watershed occupies 96,924 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Norfolk-Coxville series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 1.4%, with a range of 0-6%. Land use/land cover in the watershed includes: 40% agricultural land, 21% forested wetland, 20% forested land, 13% scrub/shrub land, 3% nonforested wetland, 2% urban land, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|---------------------------|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-051 | BIO | FW | Jackson Branch at S-03-18 |
| CSTL-076 | SS | FW | Whippy Swamp at S-25-13 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **JACKSON BRANCH** (CSTL-051) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are fully supported in **WHIPPY SWAMP** (CSTL-076). Although there were dissolved oxygen excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

03050207-060. Watershed 03050207-060 (map page 117) is located in Barnwell and Bamberg Counties and consists of upper **LITTLE SALKEHATCHIE RIVER** and its tributaries. The upper Little Salkehatchie River watershed contains a total of 46.42 stream miles. The Little Salkehatchie River originates near the Towns of Blackville and Denmark; Little Salkehatchie Creek is joined by Colston Branch (Indian Camp Branch).

The watershed occupies 72,716 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Fuquay-Dothan-Troup-Rains series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 2.6%, with a range of 0-10%. Land use/land cover in the watershed includes: 30% agricultural land, 26% scrub/shrub land, 26% forested land, 15% forested wetland, 1% urban land, <1% barren land, <1% nonforested wetland, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD) [†] |
|---|-----------------|-----------------|-------|-------------------------|
| SC0040215 | DENMARK/CITY OF | LITTLE SALK. | MU | 0.388 |
| SC0040215 | DENMARK/CITY OF | LITTLE SALK. | MU | 1 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| [†] MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|---|-------|--------------------|---------------------------------------|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-566 | BIO | FW | Little Salkehatchie River at SC 70 |
| CSTL-115 | SS | FW | Little Salkehatchie River at U.S. 601 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on the **LITTLE SALKEHATCHIE RIVER** in this watershed unit. At the upstream site (CSTL-566) aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (CSTL-115), aquatic life uses are fully supported. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This portion of the Little Salkehatchie River was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03050207-070. Watershed 03050207-070 (map page 117) is located in Bamberg County and consists of **LEMON CREEK** and its tributaries. The Lemon Creek watershed drains into the Little Salkehatchie River, incorporating the drainages of Grapevine Creek and Halfmoon Creek. There are a total of 24.72 stream miles in this watershed.

The watershed occupies 38,168 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Fuquay-Coxville-Troup-Dothan series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 2.6%, with a range of 0-10%. Land use/land cover in the watershed includes: 38% forested land, 21% scrub/shrub land, 20% agricultural land, 18% forested wetland, 3% urban land, <1% barren land, and <1% water. The watershed lies between the Towns of Denmark and Bamberg.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|-------------------------|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-576 | BIO | FW* | Lemon Creek at S-05-74 |
| CSTL-116 | SS | FW* | Lemon Creek at S-05-541 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on **LEMON CREEK**. At the upstream site (CSTL-576), aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (CSTL-116), aquatic life uses are fully supported, but may be threatened by a very high concentration of zinc measured in 1996. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03050207-080. Watershed 03050207-080 (map page 121) is located in Bamberg and Colleton Counties and consists of the **LITTLE SALKEHATCHIE RIVER** and its tributaries from just below Lemon Creek to Buckhead Creek. This watershed incorporates a total of 20.3 stream miles. Drainages from the upper Little Salkehatchie River watershed (03050207-060), the Lemon Creek watershed (03050207-070) and the Buckhead Creek watershed (03050207-090) flow into this segment of the Little Salkehatchie River.

The watershed occupies 42,249 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Lynchburg-Torhunta-Rains-Goldsboro-Coxville series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 1.5%, with a range of 0-10%. Land use/land cover in the watershed includes: 31% forested land, 26% forested wetland, 21% agricultural land, 19% scrub/shrub land, 2% nonforested wetland, <1% barren land, <1% urban land, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|------------------------------------|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-117 | SS | FW | Little Salkehatchie River at SC 64 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in the **LITTLE SALKEHATCHIE RIVER** (CSTL-117). Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

03050207-090. Watershed 03050207-090 (map page 121) is located in Bamberg and Colleton Counties and consists of **BUCKHEAD CREEK** and its tributaries. The Buckhead Creek watershed contains a total of 26.7 stream miles, and drains into the Little Salkehatchie River. Buckhead Creek incorporates drainages from Bear Creek, Hog Branch and Deep Bottom Creek.

The watershed occupies 50,612 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Lynchburg-Goldsboro series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 1.2%, with a range of 0-3%. Land use/land cover in the watershed includes: 36% forested land, 34% scrub/shrub land, 15% agricultural land, 9% forested wetland, 4% barren land, 2% urban land, <1% nonforested wetland, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|---|----------------------|------------------------|--------------|-------------------------------|
| SC0033766 | RUFFIN HIGH SCH/COLL | BUCKHEAD SW | CO | 0.015 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| [†] MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|---|--------------|--------------------------|----------------------------|
| Station Number | Type* | Class[†] | Station Description |
| CSTL-119 | SS | FW | Buckhead Creek at SC 212 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **BUCKHEAD CREEK** (CSTL-119). Although there were dissolved oxygen and pH excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

03050207-100. Watershed 03050207-100 (map page 121) is located in Bamberg and Colleton Counties and consists primarily of the **WILLOW SWAMP** and its tributaries. The Willow Swamp watershed incorporates the drainages from McCurren Branch, Fender Creek and Dry Branch before flowing into the Little Salkehatchie River. There are a total of 16.14 stream miles in this watershed.

The watershed occupies 34,049 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Lynchburg-Goldsboro-Torhunta series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 1.3%, with a range of 0-2%. Land use/land cover in the watershed includes: 31% agricultural land, 27% forested wetland, 26% forested land, 14% scrub/shrub land, 2% nonforested wetland, <1% urban land, <1% barren land, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|--------------|--------------------------|----------------------------|
| Station Number | Type* | Class[†] | Station Description |
| CSTL-118 | SS | FW | Willow Swamp at S-15-27 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **WILLOW SWAMP** (CSTL-118). Although there were a dissolved oxygen and a pH excursion, because of the small number of samples, aquatic life uses are considered to be fully supported. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

03050207-110. Watershed 03050207-110 (map page 121) is located in Colleton County and consists of the lower **LITTLE SALKEHATCHIE RIVER** and its tributaries from Willow Swamp to its confluence with the Salkehatchie River. This Little Salkehatchie River watershed contains a total of 29.3 stream miles, and drains into the Salkehatchie River. Before joining the Salkehatchie River, this river segment accepts the drainages of Indian Creek and Deep Creek, together with the drainages of the upstream watersheds (03050207-060, 070, 080, 090 and 100).

The watershed occupies 46,417 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Lynchburg-Goldsboro-Torhunta series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 1.3%, with a range of 0-2%. Land use/land cover in the watershed includes: 40% forested land, 25% scrub/shrub land, 15% forested wetland, 13% agricultural land, 3% barren land, 2% urban land, <1% nonforested wetland, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|------------------------------------|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-120 | SS | FW | Little Salkehatchie River at SC 63 |
| CSTL-585 | BIO | FW | Sandy Run Creek at US 21 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in the **LITTLE SALKEHATCHIE RIVER** (CSTL-120), but may be threatened by a very high concentration of chromium measured in 1996. Although there were dissolved oxygen excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

Aquatic life uses are fully supported in **SANDY RUN CREEK** (CSTL-585) based on macroinvertebrate community data. Recreational use support was not assessed.

03050208-010. Watershed 03050208-010 (map page 124) is located in Colleton, Hampton and Beaufort Counties and consists primarily of the **COMBAHEE RIVER** and its tributaries. The confluence of the Salkehatchie River and the Little Salkehatchie River form the Combahee River, which flows into St. Helena Sound and the Atlantic Ocean. There are a total of 50.43 stream miles in this watershed. Black Creek flows into the Combahee River in the upper area of the watershed; and much farther downstream the river accepts

drainage from Calfpen Swamp. Calfpen Swamp drains into the river in the brackish zone. The Combahee River Estuary accepts drainage from the Old Chehaw River and the New Chehaw River before flowing into the sound. The Winbee Creek drainage and the Channel Williman Creek drainage merge to form the Bull River, which runs parallel to the Combahee and flows into the sound.

The watershed occupies 223,344 acres of the Lower Coastal Plain and Coastal Zone regions of South Carolina. The predominant soil types consist of an association of the Bohicket-Bladen-Coosaw-Capers-Wahee series. The erodibility of the soil (K-factor) averages 0.12; the slope of the terrain averages 1.1%, with a range of 0-6%. Land use/land cover in the watershed includes: 36% forested land, 18% forested wetland, 17% scrub/shrub land, 16% nonforested wetland, 6% water, 5% agricultural land, 1% urban land, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD) [†] |
|-----------|------------------|-----------------|------------|--------------------|
| SC0025950 | YEMASSEE/TOWN OF | COMBAHEE RV | MU | 0.24 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|----------------------|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-583 | BIO | FW | Black Creek at US 21 |
| CSTL-111 | S | FW | Combahee River below Yemassee Sewage Outfall |
| CSTL-584 | BIO | FW | Remick Swamp Creek at S-15-41 |
| CSTL-098 | P | FW/SFH | Combahee River at US 17, 10 miles ESE of Yemassee |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

A fish consumption advisory has been issued by the Department for mercury and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0103).

Aquatic life uses are fully supported in **BLACK CREEK** (CSTL-583) based on macroinvertebrate community data. Recreational use support was not assessed.

Aquatic life uses are not supported in **REMICK SWAMP CREEK** (CSTL-584) based on macroinvertebrate community data. Very little data exists on natural community composition from streams in this hydrogeologic setting. The observed community structure may actually reflect natural conditions for streams of this type. Recreational use support was not assessed.

There are two monitoring sites on the **COMBAHEE RIVER** in this watershed unit. At the upstream site (CSTL-111), aquatic life uses are not supported due to dissolved oxygen excursions. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved

oxygen concentrations. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

At the downstream site (CSTL-098), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH, compounded by the detection of diethyl phthalate in 1994. This monitoring site is located in the freshwater-saltwater mixing zone. Low dissolved oxygen and pH values exemplify the natural transition of the river and are typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, benzo(k)fluoranthene and pyrene were measured in 1994, bis(2-ethylhexyl)phthalate was measured in 1995 and 1996, and di-n-butylphthalate was measured in 1995. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations, and total suspended solids, suggest improving conditions for these parameters. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Station MD-168 represents the Coosaw River, and is discussed on pages 143-144.

03050208-020. Watershed 03050208-020 (map page 127) is located in Colleton County and consists primarily of the **ASHEPOO RIVER** and its tributaries, above its confluence with Horseshoe Creek. The upper Ashepoo River watershed contains a total of 27.0 stream miles. Jones Swamp (Wolf Creek) and **IRELAND CREEK** (Allen Creek) merge near the Town of Walterboro to form the headwaters of the Ashepoo River, which flows through the Great Swamp.

The watershed occupies 102,314 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Lynchburg-Goldsboro-Echaw-Blanton series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 1.3%, with a range of 0-6%. Land use/land cover in the watershed includes: 47% forested land, 20% scrub/shrub land, 13% forested wetland, 10% agricultural land, 8% urban land, <1% water, <1% barren land, and <1% nonforested wetland.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|--------------------|------------------------|--------------|-------------------------------|
| SC0002135 | CCX FIBERGLASS | IRELAND CK | IN | 0.037 |
| SC0002135 | CCX FIBERGLASS | IRELAND CK | IN | 0.0171 |
| SC0027545 | DAYCO PRODUCTS INC | IRELAND CK | IN | 0.45 |
| SC0038989 | IVENIA BROW ELEM | ASHEPOO R. | CO | 0.004 |
| SC0040436 | WALTERBORO/CITY OF | IRELAND CK | MU | 2.64 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|--|-------|--------|--|
| Station Number | Type* | Class† | Station Description |
| CSTL-044 | S/BIO | FW | Ireland Creek at S-15-116, 5 1/2 miles N of Walterboro |
| CSTL-068 | P | FW/SFH | Ashepoo River at SC 303, 10 miles SSW of Walterboro |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **IRELAND CREEK** (CSTL-044) based on macroinvertebrate community data. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Although there were dissolved oxygen excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. A significant decreasing trend in total phosphorus concentration suggests improving conditions for this parameter. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Aquatic life uses are fully supported in the **ASHEPOO RIVER** (CSTL-068) but may be threatened by a significant increasing trend in turbidity. This monitoring site is located in the freshwater-saltwater mixing zone. Although there were dissolved oxygen and pH excursions, the low values exemplify the natural transition of the river and are typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

03050208-030. Watershed 03050208-030 (map page 127) is located in Colleton County and consists primarily of **HORSESHOE CREEK** and its tributaries. The Horseshoe Creek watershed contains a total of 25.87 stream miles, and flows into the upper Ashepoo River. This watershed consists of smaller Chessey Creek and Fuller Swamp Creek combining to form the Horseshoe Creek headwaters, and another, larger Chessey Creek flowing into Horseshoe Creek farther downstream, prior to the Ashepoo River confluence.

The watershed occupies 96,469 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Wahee-Bladen-Ogeechee-Argent-Santee series. The erodibility of the soil (K-factor) averages 0.16; the slope of the terrain averages 1.1%, with a range of 0-2%. Land use/land cover in the watershed includes: 54% forested land, 22% scrub/shrub land, 14% forested wetland, 9% agricultural land, <1% urban land, <1% barren land, <1% nonforested wetland, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------|------------------------------|
| Station Number | Type* | Class† | Station Description |
| CSTL-581 | BIO | FW | Fuller Swamp Creek at US 17A |
| CSTL-580 | BIO | FW | Chessey Creek at S-15-45 |
| CSTL-071 | SS | FW | Horseshoe Creek at SC 64 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are only partially supported in **FULLER SWAMP** (CSTL-581) based on macroinvertebrate community data. Very little data exists on natural community composition from streams in this hydrogeologic setting. The observed community structure may actually reflect natural conditions for streams of this type. Recreational use support was not assessed.

Aquatic life uses are not supported in **CHESSEY CREEK** (CSTL-580) based on macroinvertebrate community data. Very little data exists on natural community composition from streams in this hydrogeologic setting. The observed community structure may actually reflect natural conditions for streams of this type. Recreational use support was not assessed.

Aquatic life uses are fully supported in **HORSESHOE CREEK** (CSTL-071). Although there were dissolved oxygen and pH excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03050208-040. Watershed 03050208-040 (map page 129) is located in Colleton County and consists primarily of the lower **ASHEPOO RIVER** and its tributaries between Horseshoe Creek and St. Helena Sound. This watershed accepts the drainage from the upper Ashepoo River watershed (03050208-020) and the Horseshoe Creek watershed (03050208-030). The lower Ashepoo River watershed contains a total of 36.27 stream miles, which drain into St. Helena Sound and the Atlantic Ocean. A cut connects the Ashepoo River to the South Edisto River Watershed near Fenwick Island prior to entering the sound.

The watershed occupies 57,275 acres of the Coastal Zone region of South Carolina. The predominant soil types consist of an association of the Bohicket-Pungo-Bladen-Wahee series. The erodibility of the soil (K-factor) averages 0.10; the slope of the terrain averages 1.0%, with a range of 0-2%. Land use/land cover in the watershed includes: 34% forested land, 22% forested wetland, 20% nonforested wetland, 11% scrub/shrub land, 11% water, 2% agricultural land, and <1% urban land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)† |
|---|----------------|-----------------|------------|--------|
| SC0037788 | BOLEN POINT SD | ASHEPOO R. | CO | 0.01 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| †MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|---|-------|--------|---|
| Station Number | Type* | Class† | Station Description |
| CSTL-069 | S | SFH | Ashepoo River at US 17, 3.4 miles ESE of Green Pond |
| MD-251 | SS | SFH | Ashepoo River at S-15-26 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

There are two monitoring sites on the **ASHEPOO RIVER** in this watershed unit. At the upstream site (CSTL-069), aquatic life uses are fully supported. Although there were dissolved oxygen and pH excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

At the downstream site (MD-251), aquatic life uses are fully supported. Although there were dissolved oxygen and pH excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

03050208-050. Watershed 03050208-050 (map page 131) is located in Allendale and Hampton Counties and consists primarily of the upper **COOSAWHATCHIE RIVER** and its tributaries down to Black Creek. The Coosawhatchie River headwaters originate near the Towns of Allendale and Fairfax and incorporates drainage from Duck Creek, Beach Branch, Bloodhill Creek and Cedar Branch. The upper Coosawhatchie River watershed contains a total of 33.50 stream miles.

The watershed occupies 88,530 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Bonneau-Ogeechee-Norfolk series. The erodibility of the soil (K-factor) averages 0.14; the slope of the terrain averages 1.4%, with a range of 0-6%. Land use/land cover in the watershed includes: 28% forested land, 26% forested wetland, 25% agricultural land, 15% scrub/shrub land, 3% urban land, 2% nonforested wetland, <1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)† |
|---|-----------------|-----------------|------------|--------|
| SC0042382 | BRUNSON/TOWN OF | COOSAWHATCHIE | MU | 0.11 |
| *IN=industrial, CO=community, MU=municipal | | | | |
| †MGD=million gallons per day, MR=monitor and report | | | | |

| Monitoring Locations | | | |
|---|-------|--------|---------------------------------|
| Station Number | Type* | Class† | Station Description |
| CSTL-110 | P | FW | Coosawhatchie River at S-03-47 |
| CSTL-540 | BIO | FW | Coosawhatchie River at S-03-350 |
| CSTL-121 | SS | FW | Coosawhatchie River at SC 363 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0104).

There are three monitoring sites on the **COOSAWHATCHIE RIVER** in this watershed unit. At the upstream site (CSTL-110), aquatic life uses are only partially supported due to dissolved oxygen excursions, compounded by a significant decreasing trend in dissolved oxygen concentrations, a high concentration of zinc measured in 1995 and a very high concentration of chromium measured in 1996. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Further downstream (CSTL-540), aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (CSTL-121), aquatic life uses are only partially supported due to dissolved oxygen excursions. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03050208-060. Watershed 03050208-060 (map page 131) is located in Allendale and Hampton Counties and consists primarily of Black Creek and its tributaries. The Black Creek watershed originates near the Town of Estill and flows into the Coosawhatchie River, incorporating Filly Branch, Briar Creek and several unnamed tributaries. **LAKE GEORGE WARREN** is located on Black Creek at the confluence with Briar Creek. There are a total of 21.04 stream miles in this watershed.

The watershed occupies 51,137 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Bonneau-Rains-Norfolk-Lynchburg series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 1.4%, with a range of 0-6%. Land use/land cover in the watershed includes: 36% agricultural land, 27% forested land, 20% forested wetland, 10% scrub/shrub land, 4% nonforested wetland, 3% urban land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|--------------------|------------------------|--------------|-------------------------------|
| SC0039098 | SOUTHERN SOYA CORP | BLACK CREEK | IN | STORM |
| SC0039098 | SOUTHERN SOYA CORP | BLACK CREEK | IN | STORM |
| SC0039098 | SOUTHERN SOYA CORP | BLACK CREEK | IN | STORM |
| SC0044041 | PROPST AQUA FARMS | BLACK CREEK | IN | 0.864 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|-----------------------------|--------------|--------------------------|---|
| Station Number | Type* | Class[†] | Station Description |
| CSTL-075 | S | FW | Lake Warren, Black Creek arm, at S-25-41, 5 miles SW of Hampton |
| CL-062 | SS | FW | Lake Warren forebay |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

A fish consumption advisory has been issued by the Department for mercury, which while not specifically naming any waterbodies in this watershed unit, should be considered when consuming fish from this watershed (see Fish Consumption Advisory, Management Unit WMU-0104).

LAKE GEORGE WARREN (CSTL-075, CL-062) is a 600-acre impoundment on Black Creek, with a maximum depth of approximately seven feet (2.1 meters) and an average depth of approximately six feet (1.8 meters). The lake's watershed comprises 71 square miles (183.3 km²). Eutrophication assessments indicate that Lake Warren is of intermediate trophic condition among small lakes in South Carolina, and is characterized by high densities of algae and rooted aquatic plants, and the low pH and dark color typical of Coastal Plain impoundments. Aquatic life uses are not supported in Lake Warren due to dissolved oxygen excursions, compounded by a significant increasing trend in turbidity and a very high concentration of chromium measured in 1996. CSTL-075 is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site.

03050208-070. Watershed 03050208-070 (map page 135) is located in Hampton and Jasper Counties and consists of the middle reach of the **COOSAWHATCHIE RIVER** and its tributaries between Black Creek and Cypress Branch. There are a total of 29.19 stream miles in this watershed. The middle reach of the Coosawhatchie River flows past the Towns of Hampton and Varnville, and incorporates the drainage from **SANDERS BRANCH**. This watershed also accepts the drainage from the upper Coosawhatchie River watershed (03050208-050) and the Black Creek watershed (03050208-060).

The watershed occupies 65,639 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Lynchburg-Albany-Goldsboro-Pelham series. The erodibility of the soil (K-factor) averages 0.15; the slope of the terrain averages 1.2%, with a range of 0-2%. Land use/land cover in the watershed includes: 39% forested land, 28% forested wetland, 14% agricultural land, 10% scrub/shrub land, 6% urban land, 3% nonforested wetland, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|-------------------|------------------------|--------------|-------------------------------|
| SC0001830 | WESTINGHOUSE ELEC | SANDERS BR | IN | 1.9 |
| SC0021318 | HAMPTON/TOWN OF | SANDERS BR | MU | 2 |
| SC0042242 | CHAMBERS MEDICAL | SANDERS BR | IN | MR |
| SC0042242 | CHAMBERS MEDICAL | SANDERS BR | IN | STORM |
| SC0042251 | FAST FARE #681 | SANDERS BR | IN | M/R |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|--------------|--------------------------|--|
| Station Number | Type* | Class[†] | Station Description |
| CSTL-108 | S | FW* | Sanders Branch at SC Rd 363 |
| CSTL-010 | S | FW* | Sanders Branch at SC 278 |
| CSTL-011 | S/BIO | FW* | Sanders Branch at S-25-50 |
| CSTL-109 | P | FW | Coosawhatchie River at S-25-27, 2.5 miles SW of Cummings |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate | | | |
| [†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0104).

There are three monitoring sites on **SANDERS BRANCH**. At the upstream site (CSTL-108), aquatic life uses are fully supported, but may be threatened by a significant increasing trend in turbidity. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the next site downstream (CSTL-010), aquatic life uses are fully supported. A significant decreasing trend in total phosphorus concentrations suggests improving conditions for this parameter. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions. This creek

was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

At the downstream site (CSTL-011), aquatic life uses are not supported due to dissolved oxygen excursions, compounded by a significant decreasing trend in dissolved oxygen concentration and significant increasing trends in five-day biochemical oxygen demand and turbidity. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Recreational uses are not supported at this site due to fecal coliform bacteria excursions. This creek was Class B until April, 1992 and due to the implementation schedule the full effect of the more stringent fecal coliform bacteria limits may not be reflected in this assessment.

Aquatic life uses are not supported in the **COOSAWHATCHIE RIVER** (CSTL-109) due to dissolved oxygen excursions, compounded by a significant decreasing trend in pH and significant increasing trends in turbidity and total suspended solids, and a high concentration of zinc measured in 1996. In 1995, 3,3'-dichlorobenzidine was detected in the water column. In sediment, p,p'-DDD, a metabolite of DDT, was measured in 1993, di-n-butylphthalate was measured in 1995, a very high concentration of zinc was measured in 1995, and a high concentration of zinc was measured in 1996. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03050208-080. Watershed 03050208-080 (map page 135) is located in Hampton and Jasper Counties and consists primarily of **CYPRESS CREEK** and its tributaries. The Cypress Creek watershed flows into the lower reach of the Coosawhatchie River, incorporating the drainage from John Pen Branch, Ziglag Creek, Elbo Creek and Beaverdam Creek. There are a total of 22.08 stream miles in this watershed.

The watershed occupies 72,395 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Albany-Pelham-Ocilla-Chipley series. The erodibility of the soil (K-factor) averages 0.13; the slope of the terrain averages 1.3%, with a range of 0-2%. Land use/land cover in the watershed includes: 44% forested land, 21% forested wetland, 21% agricultural land, 9% scrub/shrub land, 4% nonforested wetland, 1% urban land, <1% barren land, and <1% water.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD)[†] |
|-----------------|----------------------|------------------------|--------------|-------------------------------|
| SC0042374 | YOUMAN'S FISH PONDS | ditch | IN | 0.5 |
| SC0043222 | DELOACH CATFISH FARM | JOHN PEN BR | IN | 0.1 |

*IN=industrial, CO=community, MU=municipal

[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|---|-------|--------|---------------------------|
| Station Number | Type* | Class† | Station Description |
| CSTL-582 | BIO | FW | Cypress Creek at SC 3 |
| CSTL-122 | SS | FW | Cypress Creek at S-27-108 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

A fish consumption advisory has been issued by the Department for mercury, which while not specifically naming any waterbodies in this watershed unit, should be considered when consuming fish from this watershed (see Fish Consumption Advisory, Management Unit WMU-0104).

There are two monitoring sites on **CYPRESS CREEK**. At the upstream site (CSTL-582), aquatic life uses are fully supported based on macroinvertebrate community data. Recreational use support was not assessed.

At the downstream site (CSTL-122), aquatic life uses are fully supported. Although there were dissolved oxygen and pH excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

03050208-090. Watershed 03050208-090 (map page 138) is located in Hampton, Jasper and Beaufort Counties and consists of the lower **COOSAWHATCHIE RIVER**, the **POCOTALIGO RIVER** and the **BROAD RIVER** and their tributaries. The Broad River is formed from the confluence of the lower Coosawhatchie River and the Pocotaligo River, and flows through the Broad River Estuary into **PORT ROYAL SOUND** and the Atlantic Ocean. This watershed accepts the drainage from the Coosawhatchie River watersheds (03050208-050,060,070, and 080) and interacts with the adjacent Beaufort River watershed (03050208-100) through tidal creeks.

Prior to the confluence, the Tulifinny River, **BEES CREEK** and Little Bees Creek flow into the lower Coosawhatchie River; and Haulover Creek flows into the headwaters of the Pocotaligo River. Boyds Creek, together with East Branch Creek, West Branch Creek, South Haulover Creek and Whale Branch (Middle Creek) all drain into the headwaters of the Broad River. Euhaw Creek enters the Broad River farther downstream together with Hazzards Creek. Okatee River, Callawassie Creek, Chechessee Creek and Sawmill Creek all flow into the **COLLETON RIVER**, which flows into the **CHECHESSEE RIVER**. The Chechessee River combines with the Broad River in Port Royal Sound, but they are also connected to Daws Creek between Daws and Lemon Islands. Also entering the sound are Edding Creek, Ballast Creek and Archer Creek. There are a total of 92.7 stream miles in this watershed.

The watershed occupies 265,585 acres of the Coastal Zone of South Carolina. The predominant soil types consist of an association of the Bohicket-Argent-Okeetee-Coosaw-Albany series. The erodibility of the soil (K-factor) averages 0.13; the slope of the terrain averages 1.2%, with a range of 0-2%. Land use/land cover in the watershed includes: 40% forested land, 19% water, 15% nonforested wetland, 11% forested wetland, 6% scrub/shrub land, 6% agricultural land, 2% urban land, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD) [†] |
|-----------|----------------------|-----------------|-------|-------------------------|
| | RIDGELAND (proposed) | CAPT BILLS CK | MU | 0.25 |
| SC0000825 | US MARINES/BEAUFORT | ALBERGOTTI | IN | 0.75 |
| SC0034550 | STUCKEY'S PECAN SHOP | LITTLE BEES | CO | 0.005 |
| SC0035394 | DIXIE BOY TRUCK STOP | COOSAWHATCHIE | CO | 0.01 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|----------------------|-------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| CSTL-107 | P | FW/SFH | Coosawhatchie River at US 17 at Coosawhatchie |
| MD-128 | S | SB | Bees Creek at SC 462, 5.9 miles NE of Ridgeland |
| MD-007 | P | SFH | Pocotaligo River at US 17 at Pocotaligo |
| MD-116 | P | SFH | Broad River at SC 170, 7.5 miles SW of Beaufort |
| MD-172 | S | SFH | Broad River at Mouth of Archer Creek on SW side of USMC base |
| MD-117 | S | SFH | Chechessee River at SC 170, 10.5 miles SW of Beaufort |
| MD-176 | SS | ORW | Colleton River at Colleton Neck, at junction with Chechessee River |
| MD-245 | P | ORW | Colleton River near mouth (Shellfish Station 18-5) |
| MD-006 | S | SFH | Port Royal between buoy 25 & 24, W of Bay Point Island |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

A fish consumption advisory has been issued by the Department for mercury and includes portions of this watershed (see Fish Consumption Advisory, Management Unit WMU-0104).

Aquatic life uses are fully supported in the **COOSAWHATCHIE RIVER** (CSTL-107), but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. This monitoring site is located in the freshwater-saltwater mixing zone. Although there were dissolved oxygen and pH excursions, the low values exemplify the natural transition of the river and are typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site.

Aquatic life uses are only partially supported in **BEES CREEK** (MD-128) due to dissolved oxygen excursions, compounded by a significant decreasing trend in pH and a significant increasing trend in turbidity.

This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Although there were pH excursions, these were typical of values seen in blackwater systems. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are only partially supported at this site due to fecal coliform bacteria excursions.

Aquatic life uses are fully supported in the **POCOTALIGO RIVER** (MD-007). Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

There are two monitoring sites on the **BROAD RIVER**. At the upstream site (MD-116), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH and a significant increasing trend in total nitrogen concentrations. In sediment, a very high concentration of copper was measured in 1995. Significant decreasing trends in total phosphorus concentrations and turbidity suggest improving conditions for these parameters. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

At the downstream site (MD-172), aquatic life uses are fully supported, but may be threatened by significant decreasing trends in dissolved oxygen concentrations and pH. Although there were dissolved oxygen excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in the **CHECHESSEE RIVER** (MD-117), but may be threatened by significant decreasing trends in dissolved oxygen concentrations and pH. Although there were dissolved oxygen excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. A significant decreasing trend in total phosphorus concentrations suggests improving conditions for this parameter. Recreational uses are fully supported at this site.

There are two monitoring sites on the **COLLETON RIVER**. At the upstream site (MD-176), aquatic life uses are fully supported, but may be threatened by a significant decreasing trend in pH. Recreational uses are fully supported at this site and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

At the downstream site (MD-245), aquatic life uses are fully supported, but may be threatened by significant increasing trends in total phosphorus and total nitrogen concentrations. A significant decreasing trend in five-day biochemical oxygen demand suggests improving conditions for this parameter. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in **PORT ROYAL SOUND** (MD-006). A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

A baseline assessment of the ecological health of Okatee River estuarine drainage system is being performed by SCDHEC, the South Carolina Department of Natural Resources Marine Resource Research Institute, the National Marine Fisheries Service, and the Town of Hilton Head. The Okatee River is a relatively undeveloped watershed, but development pressures may significantly alter the character of this drainage system in the future. The baseline assessment will provide useful data on the physical and biological condition of various estuarine habitats within the drainage system using a variety of physical and biological measures. A draft report will be prepared by September, 1998.

03050208-100. Watershed 03050208-100 (map page 142) is located in Beaufort County and consists of the **BEAUFORT RIVER**, **COOSAW RIVER**, and Morgan River and their tributaries. The Beaufort River watershed, which includes the Beaufort River Estuary, consists primarily of sea islands and the tidally influenced creeks that separate them. The Coosaw River and Morgan River flow into St. Helena Sound and into the Atlantic Ocean. The Beaufort River connects to the Coosaw River via **WHALE BRANCH**, and experiences tidal flux; the Beaufort River drains into the ocean primarily through Port Royal Sound. There are a total of 40.8 stream miles in this watershed.

The watershed occupies 170,093 acres of the Coastal Zone region of South Carolina. The predominant soil types consist of an association of the Bohicket-Capers-Lynnhaven-Lakeland series. The erodibility of the soil (K-factor) averages 0.08; the slope of the terrain averages 1.6%, with a range of 0-6%. Land use/land cover in the watershed includes: 34% nonforested wetland, 24% water, 23% forested land, 7% scrub/shrub land, 6% urban land, 5% agricultural land, <1% barren land, and <1% forested wetland. Hunting Island State Park is encircled by Harbor Creek, Fripp Inlet, St. Helena Sound and the Atlantic Ocean.

Permitted Discharges

| Permit # | Facility | Receiving Water | Flow Type* | (MGD)[†] |
|-----------------|-------------------------|------------------------|-------------------|--------------------------|
| SC0000825 | US MARINES/BEAUFORT | ALBERGOTTI | IN | 0.75 |
| SC0000914 | LOBECO PRODUCTS INC | WHALE BR | IN | 0.353 |
| SC0002577 | US MARINES/PARRIS IS | BEAUFORT RIV | IN | 0.015 |
| SC0002577 | US MARINES/PARRIS IS | BEAUFORT RIV | IN | 3 |
| SC0002577 | US MARINES/PARRIS IS | BEAUFORT RIV | IN | 7.2 |
| SC0021016 | BEAUFORT/CITY OF | BEAUFORT RIV | MU | 4 |
| SC0025054 | SC DEPT PRT | ATLANTIC | CO | 0.1 |
| SC0027481 | JAMES J DAVIS | HALFMOON CK | CO | 0.008 |
| SC0032310 | HOWARD JOHNSONS | SALT CK | CO | 0.025 |
| SC0032352 | MARSH HARBOR | BROOMFIELD CK | CO | 0.035 |
| SC0032352 | MARSH HARBOR (proposed) | BROOMFIELD CK | MU | 0.1 |
| SC0032352 | MARSH HARBOR (proposed) | BROOMFIELD CK | MU | 0.12 |

| Permit # | Facility | Receiving Water | Type* | Flow (MGD) [†] |
|-----------|----------------------|-----------------|-------|-------------------------|
| SC0039811 | BJW&SA/FROGMORE WTP | BEAUFORT RIV | MU | 0.6 |
| SC0041726 | OC WELCH FORD & LINC | BATTERY CK | IN | ----- |
| SC0042609 | BJW&SA/SHELL POINT W | BEAUFORT RIV | MU | 0.8 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|----------------------|-------|--------------------|--|
| Station Number | Type* | Class [†] | Station Description |
| MD-194 | S | SFH | Whale Branch at junction with Campbell's Creek |
| MD-168 | P | SFH | Coosaw River at confluence of Combahee River, near buoy 186 |
| MD-001 | S | SA | Beaufort River above Beaufort at channel marker 231 |
| MD-002 | S | SA | Beaufort River at drawbridge on US 21 |
| MD-003 | P | SA | Beaufort River below Beaufort at channel marker 244 |
| MD-004 | S | SFH | Beaufort River at junction with Battery Creek near marker 42 |
| MD-005 | P | SFH | Beaufort River below outfall of Parris Island at buoy 29 |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

Aquatic life uses are fully supported in **WHALE BRANCH** (MD-194), but may be threatened by significant decreasing trends in dissolved oxygen concentrations and pH and significant increasing trends in five-day biochemical oxygen demand and turbidity, and a very high concentration of zinc measured in 1996. Although there were dissolved oxygen excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, a high concentration of chromium was measured in 1993, and a very high concentration of chromium and high concentrations of lead and nickel were measured in 1994. Also in sediment, P,P' DDT was measured in 1992 and butylbenzyl phthalate was measured in 1996. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

Aquatic life uses are not supported in the **COOSAW RIVER** (MD-168, see map for watershed 03050208-010) due to occurrences of zinc in excess of the aquatic life acute standards, including two very high concentrations measured in 1993 and a high concentration measured in 1994, compounded by a significant increasing trend in total nitrogen concentrations. Although there were dissolved oxygen excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are fully supported at this site.

There are five monitoring sites on the **BEAUFORT RIVER**. At the most upstream site (MD-001), aquatic life uses are not supported due to dissolved oxygen excursions, compounded by significant decreasing trends in dissolved oxygen concentrations and pH, and a significant increasing trend in turbidity. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site.

At the next site downstream (MD-002), aquatic life uses are not supported due to dissolved oxygen excursions, compounded by significant decreasing trends in dissolved oxygen concentrations and pH, and a significant increasing trend in turbidity. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

Further downstream (MD-003), aquatic life uses are not supported due to occurrences of copper in excess of the aquatic life acute standards, a very high concentration of lead measured in 1993, and dissolved oxygen excursions, compounded by significant decreasing trends in dissolved oxygen concentrations and pH, and a significant increasing trend in total nitrogen concentration. Significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

At the next site downstream (MD-004), aquatic life uses are not supported due to dissolved oxygen excursions, compounded by a significant decreasing trend in dissolved oxygen concentrations. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site.

At the most downstream site (MD-005), aquatic life uses are fully supported, but may be threatened by significant decreasing trends in dissolved oxygen concentrations and pH, and a significant increasing trend in total nitrogen concentration. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

03050208-110. Watershed 03050208-110 (map page 146) is located in Beaufort County and consists primarily of the **MAY RIVER**, the Cooper River and their tributaries. The May River watershed, which includes the May River Estuary, consists of sea islands and tidally-influenced streams. The May River combines with MacKays Creek, **SKULL CREEK** and **BROAD CREEK** in **CALIBOGUE SOUND** before flowing into the Atlantic Ocean near Hilton Head Island. The May River accepts drainage from Bass Creek and Bull Creek, which also drains to the Cooper River. There are a total of 49.6 stream miles in this watershed.

The watershed occupies 86,228 acres of the Coastal Zone region of South Carolina. The predominant soil types consist of an association of the Bohicket-Lynnhaven-Lakeland-Chipley series. The erodibility of the soil (K-factor) averages 0.08; the slope of the terrain averages 1.8%, with a range of 0-6%. Land use/land cover in the watershed includes: 31% forested land, 31% water, 18% urban land, 14% nonforested wetland, 3% scrub/shrub land, 1% forested wetland, 1% agricultural land, and <1% barren land.

Permitted Discharges

| Permit # | Facility | Receiving Water | Type* | Flow (MGD) [†] |
|-----------|----------------------|-----------------|-------|-------------------------|
| SC0042501 | SOUTH ISLAND PSD | BOGGY GUT | MU | 5 |
| SC0043605 | HILTON HEAD PLANT UT | CYPRESS | CO | 0.15 |
| SC0043605 | HILTON HEAD PLANT UT | WHOOPIING CRANE | CO | 0.5 |

*IN=industrial, CO=community, MU=municipal
[†]MGD=million gallons per day, MR=monitor and report

| Monitoring Locations | | | |
|----------------------|-------|--------------------|---|
| Station Number | Type* | Class [†] | Station Description |
| MD-013 | S | SFH | Mouth of Skull Creek between channel markers 3 & 4 near Redbo |
| MD-016 | SS | ORW/SFH | Mouth of May River, 1.0 miles W of channel marker 29 |
| MD-174 | P | SFH | Broad Creek opposite end of S-07-80 |
| MD-175 | P | SFH | Calibogue Sound at mouth of Cooper River, near red buoy 32 |

* P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate
[†] TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters

Aquatic life uses are only partially supported in **SKULL CREEK** (MD-013) due to dissolved oxygen excursions, compounded by a significant decreasing trend in pH. This is a secondary monitoring station and sampling is purposely biased towards periods with the potential for low dissolved oxygen concentrations. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site.

Aquatic life uses are fully supported in the **MAY RIVER** (MD-016), but may be threatened by a significant decreasing trend in pH. Recreational uses are fully supported at this site.

Aquatic life uses are only partially supported in **BROAD CREEK** (MD-174) due to dissolved oxygen excursions, compounded by a significant increasing trend in total nitrogen concentrations and a very high concentration of zinc measured in 1996. A significant decreasing trend in five-day biochemical oxygen demand suggests improving conditions for this parameter. Recreational uses are fully supported at this site, but may be threatened by a significant increasing trend in fecal coliform bacteria concentrations.

Aquatic life uses are fully supported in **CALIBOGUE SOUND** (MD-175), but may be threatened by a significant decreasing trend in pH, a significant increasing trend in total nitrogen concentrations, and a high concentration of zinc measured in 1994. A significant decreasing trend in total phosphorus concentrations suggest improving conditions for this parameter. Recreational uses are fully supported at this site.

A nonpoint source (NPS) reduction project has been implemented in this watershed by the Town of Hilton Head through SCDHEC. The goal of the project is to improve water quality in Broad Creek, the central water body of the Island. Objectives include identifying sources of NPS pollution, evaluating potential best management practices, and informing citizens of their role in the issue. Project grant period: March 30, 1997-December 31, 1997.

A baseline assessment of the ecological health of the Broad Creek estuarine drainage system is being performed by the SCDHEC, the South Carolina Department of Natural Resources Marine Resource Research

Institute, the National Marine Fisheries Service, and the Town of Hilton Head. Broad Creek is surrounded by a watershed that is extensively developed for urban and suburban land use. The baseline assessment will provide useful data on the physical and biological condition of various estuarine habitats within the drainage system using a variety of physical and biological measures. A draft report will be prepared by September, 1998.

03050208-120. Watershed 03050208-120 (map page 149) is located in Jasper County and consists primarily of the **GREAT SWAMP** drainage. The Great Swamp originates in Calphen Bay and is joined by Broadwater Creek (Waggon Branch) farther downstream near the Town of Ridgeland.

The watershed occupies 56,959 acres of the Lower Coastal Plain region of South Carolina. The predominant soil types consist of an association of the Rains-Paxville-Albany-Lynchburg series. The erodibility of the soil (K-factor) averages 0.17; the slope of the terrain averages 1.2%, with a range of 0-2%. Land use/land cover in the watershed includes: 47% forested land, 23% forested wetland, 17% agricultural land, 8% nonforested wetland, 2% urban land, 2% scrub/shrub land, <1% barren land, and <1% water.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------------------|------------------------|
| Station Number | Type* | Class [†] | Station Description |
| MD-129 | SS | FW | Great Swamp at U.S. 17 |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

Aquatic life uses are fully supported in **GREAT SWAMP** (MD-129). Although there were dissolved oxygen and pH excursions, these were typical of values seen in blackwater systems with significant swamp drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. Recreational uses are not supported at this site due to fecal coliform bacteria excursions.

03050208-130. Watershed 03050208-130 (map page 149) is located in Jasper and Beaufort Counties and consists of the lower portion of the Great Swamp and the **NEW RIVER** and their tributaries. The New River watershed, which includes the New River Estuary, drains to the Atlantic Ocean. Great Swamp and Bagshaw Swamp join to form the New River. Causeway Swamp enters the New River, as does Bob Dam Swamp and Brickyard Swamp downstream. There are a total of 11.0 stream miles in this watershed. The New River forms a section of the Atlantic Intracoastal Waterway before entering the Atlantic Ocean near Daufauskie Island. This watershed accepts the drainage of the upper Great Swamp (03050208-120) and interacts with the Wright River watershed (03050208-140) through tidal creeks.

The watershed occupies 96,023 acres of the Coastal Zone region of South Carolina. The predominant soil types consist of an association of the Argent-Okeetee-Santee series. The erodibility of the soil (K-factor) averages 0.19; the slope of the terrain averages 1.1%, with a range of 0-6%. Land use/land cover in the watershed includes: 56% forested land, 18% nonforested wetland, 12% forested wetland, 7% agricultural land, 3% water, 2% urban land, 2% scrub/shrub land, and <1% barren land.

There are no permitted discharges in this watershed.

| Monitoring Locations | | | |
|---|-------|--------|--|
| Station Number | Type* | Class† | Station Description |
| MD-118 | P | SA | New River at SC 170, 9 miles W of Bluffton |
| * P=primary, S=secondary, SS=watershed, BIO=macroinvertebrate † TPGT=trout put, grow and take; ORW=outstanding resource waters; FW=freshwaters | | | |

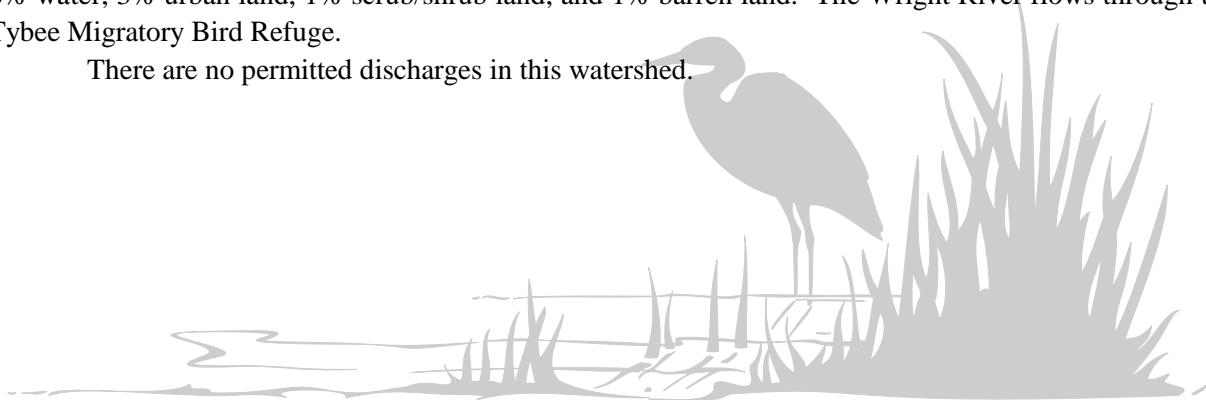
Aquatic life uses are fully supported in **NEW RIVER** (MD-118), but may be threatened by a significant decreasing trend in pH and a significant increasing trend in turbidity. Although there were dissolved oxygen and pH excursions, these were typical of values seen in tidally influenced systems with significant marsh drainage. As such they were considered to be natural in origin, and are not considered to be standards violations. In sediment, a high concentration of lead was measured in 1994. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are not supported at this site due to fecal coliform bacteria excursions, compounded by a significant increasing trend in fecal coliform bacteria concentrations.

A nonpoint source (NPS) reduction project has been implemented in this watershed by the Low Country Council of Governments through SCDHEC. The goal of the project is source identification along the New River which will include a geographic information system, land use identification, property owner identification, and analysis of monitoring data. Best management practice alternatives will be assessed. Four public education seminars will be held in the area to educate the population on the issue. Project grant period: 7/01/97-6/31/98.

03050208-140. Watershed 03050208-140 (map page 149) is located in Jasper County and consists of the Wright River and its tributaries. The Wright River is connected to the Savannah River (03060109-060) through the channel-like Mud River (Fields Cut) and Saltwater Creek. The Wright River also connects to the New River watershed (03050208-130) near Turtle Island.

The watershed occupies 30,631 acres of the Coastal Zone region of South Carolina. The predominant soil types consist of an association of the Bohicket-Capers-Coosaw series. The erodibility of the soil (K-factor) averages 0.12; the slope of the terrain averages 1.1%, with a range of 0-2%. Land use/land cover in the watershed includes: 37% nonforested wetland, 35% forested land, 11% agricultural land, 6% forested wetland, 6% water, 3% urban land, 1% scrub/shrub land, and 1% barren land. The Wright River flows through the Tybee Migratory Bird Refuge.

There are no permitted discharges in this watershed.



FACILITY AND WATERBODY INDEX

(Facility names appear in CAPITAL LETTERS)

ABBEVILLE CITY BARN, 76
ABBEVILLE/WATER, 76
AIKEN PSA/HORSE CREEK, 93
AIR PRODUCTS, 90
ALICE MFG/ELLJEAN, 39
ALLENDALE/TOWN OF, 103
ALLSTATE #225, 90
AMERADA HESS #40233, 62
AMERICAN HOUSE, 32
AMOCO, 83
AMOCO SERVICE, 106
ANDERSON CO SWR, 32
ANDERSON/GENEROSTEE, 62
ANDERSON/ROCKY RIVER, 64
Ashepoo River, 125, 126, 128, 130
AUGUSTA FIELDS SD, 79
AUGUSTA SAND & GRAVEL, 90
BARITE HILL, 70
BARNWELL/CITY OF, 110
BASF CORP/ANDERSON, 62
BASF CORPORATION, 43
Beaufort River, 141, 144
BEAUFORT/CITY OF, 143
Beaverdam Creek, 58, 82
Bees Creek, 137, 140
Betsy Creek, 64, 66
Big Curly Tail Creek, 77
Big Generostee Creek, 62, 63
Birds Branch, 113
BJW&SA/FROGMORE WTP, 143
BJW&SA/SHELL POINT, 143
Black Creek, 123, 125

Blue Hill Creek, 75, 76
BOLEN POINT SD, 130
BP OIL INC/N AUGUSTA, 83
Brasstown Creek, 54
Brier Creek, 104
Broad Creek, 145, 147
Broad River, 137, 140
Broadway Creek, 64, 66
Broadway Lake, 64, 66
BRUNSON/TOWN OF, 132
Buck Creek, 110
Buckhead Creek, 120
CALHOUN FALLS, 73
Calibogue Sound, 145, 147
Cane Creek, 38
CATEECHIE VILLAGE, 43
CCX FIBERGLASS, 126
Cedar Creek, 98
CENTRAL WESLEYAN, 47
CENTRAL/NORTH PLANT, 43
CENTRAL/SOUTH PLANT, 47
CHAMBERS MEDICAL, 134
CHAMBERT FOREST SD, 62
CHARTER TERMINAL, 90
Chattooga River, 51, 52, 54
Chauga River, 55
Chechessee River, 139, 140
Cherokee Creek, 64, 67
Chessey Creek, 128
Cheves Creek, 83
Choestoea Creek, 56, 58
CITY OF ABBEVILLE, 76

CLEMSON, 32
 CLEMSON/MAIN PLANT, 32
 Colleton River, 139, 141
 Combahee River, 109, 123, 125
 Coneross Creek, 45
 CONOCO, 83
 Coosaw River, 141, 144
 Coosawhatchie River, 109, 130, 132, 134, 136, 137, 140
 COURTENAY UTIL, 32
 Cuffytown Creek, 77, 79
 Cupboard Creek, 64, 66
 Cypress Branch, 106
 Cypress Creek, 104, 106, 136, 137
 DANIEL HIGH, 32
 DAVIDSON MINERAL, 64
 DAYCO PRODUCTS INC, 126
 DAYS INN/I-85, 32
 DELOACH CATFISH FARM, 137
 DENMARK/CITY OF, 118
 DIXIE BOY TRUCK STOP, 139
 Double Branch, 77
 DUE WEST/TOWN OF, 73
 DUKE POWER/BAD CREEK, 28
 DUKE POWER/OCONEE, 30
 EASLEY/GOLDEN CREEK, 43
 East Fork Chattooga River, 51
 East Fork of the Chattooga River, 52
 Eastatoe Creek, 30, 31, 67, 75, 91, 116, 133
 ECW&SA, 86
 ECW&SA/BROOKS AVE, 82
 ECW&SA/LAND-O-LAKES, 83
 EHRHARDT/TOWN OF, 114
 Eighteen Mile Creek, 47, 48
 FAST FARE #681, 134
 FIELDCREST CANNON, 62
 Flat Rock Pond, 84, 88, 91
 Flat Shoals River, 38
 Fourmile Creek, 98, 101
 FOXWOOD HILLS, 56
 Fuller Swamp, 128
 GATEWOOD SD, 76
 Golden Creek, 41, 43
 GRANITEVILLE CO, 90
 Great Swamp, 147, 148
 GREEN ACRES MHP, 90
 GREENWOOD, 79
 GREENWOOD MILLS, 47
 HAMPTON/TOWN OF, 134
 HARBOR GATE, 32
 Hard Labor Creek, 77, 79
 HARDEEVILLE, 106
 HEATHERWOOD SD, 47
 Hen Coop Creek, 67
 HILTON HEAD PLANT, 145
 Hollow Creek, 93, 95
 Horn Creek, 83
 Horse Creek, 88, 91
 Horseshoe Creek, 128
 HOWARD JOHNSONS, 143
 HUGGINS GARMET CO, 73
 IMPERIAL DIE CASTING, 43
 Ireland Creek, 125, 126
 ISSAQUEENA MOBILE, 32
 IVA, 62, 69
 IVENIA BROW ELEM, 126
 J M HUBER CORP, 90
 J P STEVENS/CLEMSON, 32
 Jackson Creek, 116
 JAMES J DAVIS, 143

MCCORMICK COUNTY, 79
MCCORMICK/ROCKY CK, 79
MICHELIN TIRE, 50
MILLIKEN & CO, 47, 73, 79, 110
MILLIKEN & CO/DEFORE, 32
MILLIKEN/ABBEVILLE, 76
MULTITEX CORP, 114
NACO CAROLINA, 56
New River, 148, 150
Norris Creek, 56, 58
North Fork Twelve Mile Creek, 39,
41
OAKWAY ELEM, 56
OC WELCH FORD, 143
OCONEE COUNTY SEWER, 45
Oconee Creek, 38
OWENS-CORNING, 64
PENDLETON-CLEMSON, 47
PICKENS/12 MILE CK, 39
PICKENS/TOWN CREEK, 39
PICKENS/WOLF CREEK, 39
PIONEER CONCRETE SC, 64
Pocotaligo River, 137, 140
Port Royal Sound, 137, 141
PROPST AQUA FARMS, 133
R C EDWARDS JR HS, 43
Remick Swamp Creek, 125
Rices Creek, 41
RIDGELAND, 139
Rocky Bottom Creek, 30, 31
Rocky Creek, 80
Rocky River, 64, 65
RUFFIN HIGH, 120
RYOBI MOTOR PRODUCTS, 39

SALEM HI&ELEM SCH, 36

Salkehatchie River, 109, 110, 112-114

Sand River, 88, 92

Sanders Branch, 134, 136

SANDOZ CHEMICAL CORP, 103

Savannah Creek, 114

Savannah River, 85, 86, 88, 93, 95, 103, 104, 106,
108

Sawney Creek, 73, 75

SC DEPT PRT, 70, 143

SC DEPT PRT/OCONEE, 55

SC ELEC & GAS, 93

SC ELEC & GAS / SRS, 100

SC HWY DEPT, 56

SEABOARD SYSTEM RAIL, 93

Seneca River, 32, 34

SHOALS SEWER COMPANY, 32

Six and Twenty Creek, 32, 35

Six Mile Creek, 32, 34

Skull Creek, 145

SOUTH ISLAND PSD, 145

SOUTHERN SOYA CORP, 133

SPANGLERS GROCERY, 39

Steel Creek, 98, 101

Stevens Creek, 77, 80, 82, 83

STUCKEY'S PECAN SHOP, 139

TAMASSEE DAR SCHOOL, 36

Three and Twenty Creek, 50, 51

Thurmond Reservoir, 70, 72

Tims Branch, 95, 98

Toby Creek, 113

TODDS CAR WASH, 93

Toxaway Creek, 55

Tugaloo Lake, 52, 54

Turkey Creek, 80, 110, 112

Twelve Mile Creek, 39, 41, 44

Upper Three Runs Creek, 95, 98

US MARINES/BEAUFORT, 143

US MARINES/PARRIS IS, 143

US WILDLIFE SERV., 51

USDOE-WESTINGHOUSE
SRS, 97, 100

Vaocluse Pond, 84, 88, 91

WALTERBORO/CITY OF, 126

WEST-OAK HS, 56

WESTINGHOUSE ELEC, 134

WESTMINSTER/WATER, 56

Whale Branch, 141, 144

Whippy Swamp, 116

WHISPERING PINES SD, 47

Willow Swamp, 120, 122

Wilson Creek, 69, 70

Woodside Branch, 47, 48

YEMASSEE/TOWN OF, 123

YODER BROTHERS ,INC, 50

YOUMAN'S FISH PONDS, 137



APPENDIX A

Public Participation Summary

The **UPPER SAVANNAH** Watershed Workshop was held in Clemson on January 30, 1997. The information exchanged will be very useful as we begin the next cycle of the Watershed Water Quality Management Strategy.

The workshop produced several categories of concerns about water quality. The overriding concern for the upper basin is the rapid rate of residential, commercial and industrial growth. This growth directly or indirectly leads to many of the more specific concerns expressed including, but not limited to, increased runoff, increased usage of septic systems, enforcement concerns, trout waters concerns and educational opportunities.

The most prevalent concern is runoff. Specifically, participants questioned the effectiveness of sediment and erosion control practices including the handling of the Sediment and Erosion Control Act. Enforcement issues and the lack of education about runoff controls were also cited. Concerns for the runoff associated with building and maintaining golf courses, nutrient runoff, agricultural runoff and forestry were also expressed.

For many workshop participants septic systems are seen as a serious threat to water quality in the Upper Savannah Basin. The concern lies with the suitability of the soils for septic tanks as well as the potential malfunctioning and lack of care of septic tanks.

Many other water quality issues were articulated including DHEC's enforcement of water quality laws, discharges from boats, the operation of lakes, the degradation of trout waters, DHEC's focus on correction of problems instead of prevention, and the need to coordinate efforts between DHEC and other organizations, agencies and states.

In addition to the problems, several positive activities that are protecting or improving water quality were mentioned. These include efforts by the Natural Resource Conservation Service (NRCS) and the Department of Natural Resources (DNR) district offices, local organizations such as Friends of Lake Keowee Society (FOLKS), Duke Power, farmers, the Cattlemen's Association, recycling efforts, and DHEC's NPDES program. Participants suggested activities that would aid in the protection or correction of water quality problems. Many participants feel more emphasis should be given to education. Runoff controls and the monetary benefits of best management practices (BMPs) should be taught to local land owners and developers.

Following is a complete listing of the concerns and comments from the workshop.

NONPOINT SOURCE CONCERNS

Residential growth

Industrial growth

Agriculture, development, & municipalities taking over storm water programs

Runoff from roads, agriculture, and drainage ditches

Voluntary compliance of BMPs and voluntary monitoring not working

Increased development, impervious surface, increased velocities, increased runoff

NPS runoff from development, example nutrient runoff

General runoff

Urban and suburban nutrient runoff

NPS runoff -sediment and nutrients

Lack of education for developers; developers are not required to have licenses

Sediment and storm water runoff controls

Lack of enforcement in residential development -stormwater runoff

Lack of local & state govt. working together to reduce sediment, stormwater problems.

Impact of smaller developers on WQ (exempt from Sediment and Erosion Control Act)

Erosion at small industries

Erosion is increasing because of urbanization

Agriculture BMP's (pasture, row crops) not being encouraged enough

Animals access to streams adjacent to pasture land

Livestock waste -concerned about runoff from dairies and agriculture

New golf courses

Land disturbance with increase of golf courses

Runoff from golf courses -concerned about herbicides and pesticides in runoff

Logging not following BMPs -deforestation; stormwater runoff

Increased sediment and silt at headwaters due to urban and forestry activities

Forestry BMPs are voluntary and not working

Forestry overall and streamside -not seeing enough buffers around streams

Septic tanks -lack of infrastructure; use too high

Private septic systems -feel like people are allowed to install them anywhere

Concerned about DHEC's permitting of septic systems

Population growth very scattered and not conducive to central sewer treatment

Increasing number of septic tanks contributing to contamination

Beach and campground areas (discharge from boats)

Concern about regulations for holding tanks & dumping at marinas

Water quantity as water quality problem -development leading to more water

ENFORCEMENT CONCERNS

Lack of enforcement and monitoring

Lack of uniform enforcement and monitoring

Lack of staff to uniformly enforce

Lack of enforcement in residential development -stormwater runoff

Enforcement!!

HYDROLOGIC CONCERNS

Pump/backs, turbine on lakes -seeing fish kills, sediment turnover and DO problems

DO below dams is very low -wondering if it is being addressed through relicensing

Altering stream channels on lakes (developers making more lake for lakeside property)

Hydro electric projects meet Water Quality standards

TROUT CONCERNS

Litter problems-trout streams: beverage containers, paper, plastics, tires

Aquatic habitat degradation -losing quality trout streams due to sediment

Trout water degradations from increased temp and sediment

Thermal pollution from construction of lakes and ponds

The **MIDDLE SAVANNAH & UPPER SALKEHATCHIE** Watersheds Workshop was held in North Augusta on March 13, 1997. The information exchanged will be very useful as we begin the next cycle of the Watershed Water Quality Management Strategy.

The workshop produced several categories of concerns about water quality. The overriding concern for these watersheds is growth and its associated challenges. Growth directly or indirectly leads to many of the more specific concerns expressed including, but not limited to, increased runoff, increased need for wastewater treatment, groundwater concerns, flooding concerns and partnership opportunities.

The most prevalent concerns are related to stormwater and sediment. Permitting issues and hydrologic concerns were also cited. Concern for wetlands, exotic organisms, and metals contamination was also expressed.

In addition to the problems, several positive activities that are protecting or improving water quality were mentioned. These include efforts by the US Geological Survey (USGS) and the US Environmental Protection Agency (EPA). Participants suggested activities that would aid in the protection or correction of water quality problems. Many participants feel more emphasis should be given to education. Improved data collection and utilization were encouraged.

Following is a complete listing of the concerns and comments from the workshop.

NONPOINT SOURCE CONCERNS

- Sediment control into catch basins
- Sedimentation - various sources
- Sediment control and recreational uses in subdivision ponds
- Stormwater/sediment from dirt roads
- Increased urban development and associated stormwater runoff
- Urban land use and runoff, e.g., golf courses
- Nutrient loading from urban areas (lawns)
- Forestry impacts
- Dealing with forestry sediment and erosion problems (exempt from regs)

POINT SOURCE (NPDES) CONCERNS

- Industrial concerns - coordination between states
- Georgia's industries impact decisions made in SC
- Urban growth outdistancing the wastewater treatment facilities
- WWTPs - ability of municipalities to handle growth
- Large developments and infrastructure support
- Consistency of regulations between states' permitting
- Wasteload allocation between states
- Lack of regulation of hog and turkey farms
- Future unnecessary regulation of agriculture

HYDROLOGIC CONCERNS

- River water level fluctuation
- Dam management, water quality below dam (temp. & DO)
- Saltwater intrusion due to use of groundwater and lack of interstate focus
- Potential for water use conflicts with new groundwater capacity use regs
- Effects of new construction/development on 100-year flood level

OTHER CONCERNS

- Definition of wetlands and related land use
- Impacts on wetlands
- Interagency and interstate collaboration, incl. USACE
- USACE involvement in strategy development
- More realistic water quality standards for protection of legitimate uses
- Mercury and other heavy metals in sediment and fish
- Springs with naturally low pH
- Aquifers
- Changes in WQ related to development of trout fish hatchery
- No zoning for boating use conflicts, e.g., no motors

Specific Water Quality Concerns

- Reversing turbines at the dams and WQ effects (DO, pH, etc.)
- Corps leases and other management changes
- Exotic organisms invading Savannah River
- Low DO from Thurmond dam
- Need more enforcement of stormwater regulations in Greenwood area
- Stevens Creek sediment and organic loading
- Turbidity and organics are increasing in Savannah River (drinking water)
- Effects on WQ and water level of diversion through the Augusta Canal
- Land use changes in Augusta and other areas
- Development across river from Augusta (e.g., golf course, NPS, aesthetics, habitat)
- Augusta municipal wastewater plant and its effect on Sav. R. WQ

IMPROVEMENT EFFORTS UNDERWAY

- USGS NAWQA includes Salkehatchie
- EPA's Savannah River Basin watershed project
- SREL, US Forest Service, Clemson studying streams in SRS
- Watershed approach to permitting and WQ assessment

IMPROVEMENT EFFORTS NEEDED

- Coordinated public education efforts (workshops, brochures)
- Educating children about the environment
- BMP education for general public and farmers
- More funding/creative partnerships in funding
- Encourage Conservation Reserve Program expansion
- Inclusion of data from outside sources
- Increase biological monitoring
- Increase use of Rapid Bioassessment Protocol & Index of Biological Integrity
- Preventive/proactive approach to stormwater inspections
- More interagency coordination on the local level
- Full interstate cooperation
- Open communication between government and the regulated community
- Community involvement (How does it affect me?)

Revise forestry BMPs to prohibit harvesting in the riparian zone
Reduction in solids/turbidity
Protect Upper Three Runs
Include educational facilities and environmental groups in these workshops
Keep up with major local issues related to the Savannah River

The **LOWER SAVANNAH & SALKEHATCHIE** Watersheds Workshop was held in Beaufort on March 25, 1997. The information exchanged will be very useful as we begin the next cycle of the Watershed Water Quality Management Strategy.

Workshop participants identified many water quality issues. Concern for coastal and tidal waters was especially apparent. Agriculture, increased boat use, stormwater, and septic tanks were some of the potential threats to these resources identified by attendees.

Pollutants of concern from bacteria to tritium were identified. Development issues and shellfish concerns were also discussed. Concerns for drinking water supply protection, golf course runoff control, and interstate cooperation were also expressed.

In addition to the problems, several positive activities that are protecting or improving water quality were mentioned. These include efforts by the Clean Water Task Force and Beaufort County. Participants suggested activities that would aid in the protection or correction of water quality problems. Many participants feel septic tank regulations and alternatives need immediate attention. Improved education for all basin stakeholders was encouraged.

A complete listing of the concerns and comments from the workshop follows.

NONPOINT SOURCE CONCERNS

Agricultural runoff
Agriculture impact on watershed
Possible influx of mega-farms (as NC)
Agriculture and silviculture NPS concerns
Prevent degradation from urban runoff, agriculture, forestry
Development
People don't understand NPS problems related to development
New residential development: stormwater, litter, density issues
Development impacts on water quality
Golf course runoff
Nitrogen and pesticide runoff from golf courses
Golf courses
Failing septic systems
Septic tanks
Septic tanks, coliforms - high water table, soil types
Pesticide application
Nutrient and pesticide loading
Illegal dumping
Reducing NPS fecal coliform pollution

OTHER CONCERNS

- Proliferation of private docks
- Increased boat usage
- Recreational and commercial boats -- volume, types, marinas
- Bacteria (shellfish harvesting)
- Shellfish closures
- Elevated fecal coliform levels
- Coordinating with GA better
- Consistency between GA and SC, esp. for drinking water
- Coordination with Federal agencies
- Groundwater usage
- Aquifer recharge, discharge
- Upstream water quality affecting downstream WQ
- Difference between fresh- and saltwater streams
- Pfiesteria
- Savannah River Site
- Not enough monitoring
- Destruction of nursery habitat and migratory pathways
- Mercury levels in fish

Specific Water Quality Concerns

- Broad Creek, May River, Okatie River - lack of sufficient flushing out of pollutants
- Battery Creek - Beaufort
- Broad Creek - Hilton Head
- Broad Creek and Okatie, Battery
- Okatie, Broad Creek, Chechessee - ID bacteria sources for closed shellfish waters
- Okatie River
- Maintenance of the Savannah River as potable water supply
- SRS impact on drinking water quality
- Maintain Savannah River flows - saltwater/drinking water concerns
- Tritium levels in Savannah River
- Decrease in DO, and increases in turbidity, organic and inorganic pollution in Sav. R.
- Sun City, Indigo Plantation, Indian Hill, Union Camp-Palmetto Bluff
- Union Camp - lack of enforcement (stormwater management plan)
- Salkehatchie fecal coliforms
- Salkehatchie/Coosawhatchie/Jasper County point sources impacts downstream
- New development on Huspa Creek
- Urbanization on Beaufort River
- Town of Yemassee WWTP on Combahee
- Harbor Island tidal creeks - wildlife waste close to shellfish waters
- Septic tanks and runoff threaten water quality in all urbanizing creeks in Beaufort County

IMPROVEMENT EFFORTS UNDERWAY

- Clean Water Task Force (2)
- Lower Beaufort County land use plan (zero degradation)
- BMPs for forestry and agriculture

IMPROVEMENT EFFORTS NEEDED

- DHEC needs to support Beaufort County on tighter local septic tank rules
- Stricter septic tank regulations and better enforcement
- Demonstration of alternatives to septic tanks
- Increased public information about septic system alternatives
- Use more proactive, education, technical assistance approach
- Do more public school education
- Educate developers on environmental approaches to land use
- New residential development - need educational programs
- Agencies need to coordinate more, see what's out there, work together
- Coordination among DHEC, EPA, and GA in implementing basin management
- DHEC working with Clean Water Task Force to implement recommendations
- Comprehensive planning
- Issues surrounding TMDLs should be carefully debated and studied
- Develop and use TMDLs
- Need to monitor for Cryptosporidium
- More monitoring of DO in vertical profiles and over extended time periods
- Runoff sampling at subdivisions
- BMPs should be required of everyone
- BMPs - more efforts (row cropping, sedimentation)
- Support for OCRM habitat protection in coastal zone
- OCRM independent agency status
- Need more small scale site specific studies
- COG needs support from DHEC (\$) on 208 planning
- Integrate source water protection program with watershed water quality mgmt.
- Need program to protect New River - promote responsible development
- Establishment of water quality baselines for developers
- Flexible zoning to accommodate water quality and environment
- DHEC enforce its own water quality standards

Appendix B

Water Quality Data

Monitoring Station Descriptions
Dissolved Oxygen, pH, and Bacteria Data
Phosphorus, Nitrogen, and Turbidity Data
Metals Data

ABBREVIATIONS

Station Information:

STATION NUMBER Station ID

TYPE SCDHEC station type code

- P = Primary station, sampled monthly all year round
- S = Secondary station, sampled monthly May - October
- P* = Secondary station upgraded to primary station parameter coverage and sampling frequency for basin study
- SS = Special station added for the Savannah-Salkehatchie basin study
- I* = Currently inactive station which had some data within the period reviewed
- BIO= Indicates macroinvertebrate community data assessed

WATERBODY NAME Stream or Lake Name

CLASS Stream classification at the point where monitoring station is located

Parameter Abbreviations and Parameter Measurement Units:

| | | | |
|------|---|-----|-----------------|
| DO | Dissolved Oxygen (mg/l) | NH3 | Ammonia (mg/l) |
| BOD | Five-Day Biochemical Oxygen Demand (mg/l) | CD | Cadmium (ug/l) |
| pH | pH (SU) | CR | Chromium (ug/l) |
| TP | Total Phosphorus (mg/l) | CU | Copper (ug/l) |
| TN | Total Nitrogen (mg/l) | PB | Lead (ug/l) |
| TURB | Turbidity (NTU) | HG | Mercury (ug/l) |
| TSS | Total Suspended Solids (mg/l) | NI | Nickel (ug/l) |
| BACT | Fecal Coliform Bacteria (#/100 ml) | ZN | Zinc (ug/l) |

ABBREVIATIONS

Statistical Abbreviations:

| | |
|-----------|--|
| N | For standards compliance, number of surface samples collected between January, 1992 and December, 1996 For trends, number of surface samples collected between January, 1982 and December, 1996 |
| EXC. | Number of samples contravening the appropriate standard |
| % | Percentage of samples contravening the appropriate standard |
| MEAN EXC. | Mean of samples which contravened the applied standard |
| MED | For heavy metals with a human health criterion, this is the median of all surface samples between January, 1992 and December, 1996. DL indicates that the median was the detection limit. |
| MAG | Magnitude of any statistically significant trend, average change per year, expressed in parameter measurement units |

Key to Trends:

| | |
|---------|---|
| D | Statistically significant decreasing trend in parameter concentration |
| I | Statistically significant increasing trend in parameter concentration |
| * | No statistically significant trend |
| (Blank) | Insufficient data to test for long term trends |